THE LIBRARY OF CONGRESS
1800

9

2120

THE

ENTOMOLOGIST

An Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
DR. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

VOLUME THE TWENTY-EIGHTH.

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN,
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., LIMITED.

1895.

"A grand and almost untrodden field of inquiry will be opened, in the causes and laws of variation, on correlation, on the effects of use and disuse, on the direct action of external conditions, and so forth. The study of domestic productions will rise immensely in value. A new variety raised by man will be a more important and interesting subject for study than one more species added to the infinitude of already recorded species. Our classifications will come to be, as far as they can be so made, genealogies; and will then truly give what may be called the plan of creation. The rules for classification will no doubt become simpler when we have a definite object in view. We possess no pedigrees or armorial bearings; and we have to discover and trace the many diverging lines of descent in our natural genealogies, by characters of any kind which have long been inherited. Rudimentary organs will speak infallibly with respect to the nature of long-lost structures. Species and groups of species which are called aberrant, and which may fancifully be called living fossils, will aid us in forming a picture of the ancient forms of life. Embryology will often reveal to us the structure, in some degree obscured, of the prototypes of each great class."—DARWIN, '*Origin of Species.*'

Insects.

CONTENTS.

ALPHABETICAL LIST OF CONTRIBUTORS.

Abbott, P. W., 18
Adams, F. C., F.E.S., 279
Adkin, Robert, F.E.S., 84, 316, 317
Alderson, E. G., 33
Alderson, Rev. E., 280
Allworthy, A. E., 230, 255
Anderson, Joseph, 313
Andrews, H. W., 282
Arkle, J., 55, 163, 243, 257, 335
Auld, Henry A., 161

Barnes, W., 182
Bartlett, Chas., 311
Bath, W. Harcourt, 204, 247, 266, 286, 322
Baylis, Ernest, 20
Beales, J. H. O., 308, 317
Bedford, C. E., 282
Beeching, R. A. Dallas, F.E.S., 281
Bell-Marley, H. W., 281
Berney, John, 311
Bignell, G. C., F.E.S., 83, 183, 315
Billups, T. R., F.E.S., 46, 161, 163, 215, 231, 266, 279
Bird, J. F., 317
Blaber, W. H., F.E.S., 319, 340
Blagg, E. W. H., 207, 233
Blake, A. H., 89
Bonaparte-Wyse, L. H., 57, 280
Brackenbury, E. A., 338
Briggs, C. A., F.E.S., 57, 159
Briggs, F. J., 266
Bromilow, Frank, F.E.S., 336
Brown, H. Rowland, F.E.S., 208, 305
Bunn, C. Northon, 205
Butler, Arthur G., Ph.D., F.L.S., F.E.S., &c., 120, 222, 275
Butler, W. E., 162, 208, 281

Cambridge, Rev. O. P., 88, 255
Cattle, J. R., 205
Chapman, T. A., M.D., F.E.S., 285, 318
Chawner, Laurence C., 279
Chawner, Miss, 168
Chittenden, D., 281
Chope, R. Stafford, 308, 309, 331
Christy, W. M., F.E.S., 214, 229
Cockerell, T. D. A., F.E.S., &c., 100, 304
Cooke, O. F. E., 336
Cottingham, Miss M. L, 20
Cox, W. Edney, 19, 57
Cross, Mrs., 207
Crowther, Henry, 16, 241, 250, 272

Dale, C. W., F.E.S., 97, 181, 256, 258, 333
Dalglish, A. Adie, 278
Dannatt, W., F.E.S., 307
Dixey, Dr. F. A., F.E.S., 69, 102, 142

Edelsten, H. U., 162, 337
Elisha, Geo., F.E.S., 130

Fernald, Prof. C. H., F.E.S., 255
Fitzgerald, R. W., 336, 339
Fletcher, T. B., 133, 181, 183, 305, 309
Fountain, J. T., 233, 304
Frohawk, W. F., F.E.S., 237, 263, 280, 282, 306, 308, 310, 311, 318

Garbowski, T. H., Ph.D., J.U.C., 125
Garde, Philip de la, R.N., F.E.S., 153
Garland, G. R., 309
Gloyns, Douglas B., 208
Grover, W., 150
Gummer, C. M., 282, 312

Haggart, J. C., 297
Hall, Thos. W., F.E.S., 132, 202, 203, 232, 307
Hamm, A. H., 182
Harker, T. H., 233
Heath, A. R., 309, 341
Hewett, W., 3, 27, 290
Hodge, Harold, 256, 282
Hodges, Albert, 17
Hodgkinson, J. B., F.E.S., 56, 141, 181, 208, 337
Hooker, W. G., 280
Hopely, Miss Catherine, C., 53, 160
Hopkins, F. Gowland, 1
Hyde, Jno. P., 312

Jacoby, Martin, F.E.S., 189
James, Russell E., 87, 230, 259

Jefferys, T. B., 206, 208, 278, 336
Jones, H. Bickerton, 56

Kane, W. F. de Vismes, B.A., F.E.S., &c., 13, 79, 155, 180, 195, 216, 327
Kaye, W. J., 181
Kenward, J. N., 162
Kirby, W. F., F.L.S., F.E.S., &c., 165
Knaggs, Dr. H. Guard, F.L.S., 76, 83, 228

Laddiman, R., 309
Leake, R. M., 312
Leigh, J. Hamilton, 132
Lewington, W., 336
Lucas, W. J., B.A., 208, 257, 279, 337

Mansbridge, W., F.E.S., 90, 164, 213, 316
Mansfield, M. J., 18
Mayor, C. M., 59, 133
McArthur, H., 204
Melluson, F., 257
Merrifield, F., F.E.S., 69
Meynell, G. J., 308
Milton, F., 304
Mitchell, Alfred T., 83, 89
Morley, Claude, 63, 314
Morley, Geo. Stanley, 233, 280, 312
Morris, Chas. E., 232
Morris, H. S., 256

Nash, C. J., 61, 134, 341
Neel, G. H., 280, 282

Oldham, Chas., 308, 311
Olliff, A. Sidney, F.E.S., 114

Parkinson, Curtis W., 163
Payne, Fred. W. G., 49, 117, 170
Pearce, Walter A., 19, 338
Pegler, Stephen, 281
Phipps, M. M., 257
Potter, Alistoir R., 279
Prideaux, R. M., 16
Prout, Louis B., F.E.S., 132
Pyett, Claude A., 19, 89

Rendlesham, the Right Honble. Lord, F.E.S., 232
Rickard, J. C., 261
Rothschild, the Hon. Walter, F.Z.S., F.E.S., &c., 78
Rowland-Brown, H., M.A., F.E.S., 58
Russell, S. G. C., F.E.S., 194

Salter, J., 281
Schneider, Henry, 93
Searancke, N. F., 335
Sharp, Dr. David, F.R.S., F.E.S., &c., 129
Shepheard-Walwyn, H. W., 182, 208, 233, 257, 281
Shipp, John W., 2, 18, 37, 178, 218, 220
Simmons, W. J. H., 308
Smith, C. Rhoades, 233
Smith, W. W., 175
Somerset, W. H., 258
South, Richard, 40, 53, 54, 55, 56, 84, 89, 129, 133, 135, 300, 303, 312, 315, 335, 338
Sparke, Ed. G. J., 310
Spencer, S. H., 311
Standfuss, Dr. M., 69, 102, 142
Step, Edward, 311
Still, Major John N., F.E.S., 11
Stockwell, H. Douglas, 337
Studd, E. F., 134
Sturt, W. T., 312, 336
Swinhoe, Colonel C., F.E.S., 337

Tait, E. H., 19
Tait, R., 233
Tarbat, Rev. J. E., 336, 337
Taylor, H., 308
Thornewill, Rev. Chas. F., F.E.S., 133, 281
Thornhill, W. B., 18, 159, 229
Tugwell, W. H., 8, 277
Tunstall, W., 130
Turner, D. P., 89, 135, 277, 282, 307
Turner, Hy. J., F.E.S., 303

Viggers, Charles, 135

Walker, Dr. F. A., D.D., F.E.S., 258
Waters, Albert H., 339
Watts, C. W., 84
Watson, John, 30, 161
Willan, Ed., 57
Wilson, Miss M., 337
Winser, Harold C., 311
Wood, H., 309
Woodforde, F. C., 264, 280, 310, 339
Woolstein, W. H., 310

ALPHABETICAL LIST OF SUBJECTS.

Aberration in the structure of appendages in the Coleoptera, 125
Ablabia argentana, 25
Abnormal emergence of Endromis versicolor, 89
Abraxas grossulariata, vars. 231, 284, 300, 307; sylvata, 171; ulmata, 42, 60, 162, 170
Acetebia præcox, 199
Acherontia atropos, 50, 67, 280, 309, 310, 336, 346
Acidalia circellata, 132; contiguaria, 138, 162; emarginata, 86, 171; fumata, 171; imitaria, 19, 36, 134, 171; marginepunctata, 162; ochrata, 316; rusticata, 86; subsericeata, 85, 162, 171, 270; var. mancuniata, 135
Aciptilia paludum, 88; tetradactyla, 162
Acontia luctuosa, 235
Acronycta alni, 117, 207; leporina, 44, 85, 86, 138, 207, 235, 265, 338; ligustri, 59, 85, 117, 138, 260; menyanthidis, 269; tridens, 44, 87, 117
Adela australis, 135
Aëpophilus bonnairii, 183
Aëpus robinii, 183
Æschna cyanea, 204
African Rhopalocera, 153
Agdistes bennetii, 314
Aglia tau, 149
Aglossa pinguinalis, 229
Agrion puella, 207
Agriopis aprilina, 85, 341
Agrotera nemoralis, 316
Agrotis agathina, 92, 118, 134; aquilina, 62, 118, 198, 199, 298, 305, 314; ashworthii, 212, 232, 233; cinerea, 35; cursoria, 186, 197, 211, 298; corticea, 43, 196; lunigera, 195, 200; obelisca, 118, 198, 348; obscura, 118; præcox, 299; puta, 17, 19, 62, 118, 180, 303; pyrophila, 118; ravida, 87, 118; ripæ, 197, 212, 306; saucia, 60, 118, 195, 313; simulans, 118, 200; strigula, 199, 340; tritici, 186, 197, 299; vestigialis, 180, 298
Amblyptilia cosmodactyla, 88
Ammonia bottle for field use, 335
Amphidasys betularia, 7, 18, 62, 132, 170, 270; prodromaria, 19, 60, 182; strataria, 170, 234
Anarta myrtilli, 120
Andrena angustior, 211; atriceps 343; furcata, 211; fulva, 343; rosæ, 235
Angeronia prunaria, 16
Anisota stigma, 22
Anthidium manicatum, 284
Anthocharis cardamines, 91
Anthrocera trifolii, 60
Anticlea derivata, 36; nigrofasciaria, 134, 172; rubidata, 172, 313, 341
Ants and their companions, 97
Apamea dumerilii, 135; leucostigma, 15; ophiogramma, 15, 84, 204
Apatura iris, 131, 194, 232, 233
Aphelia argentana, 25
Aplecta advena, 314; herbida, 85, 120, 265; occulta, 120, 284; prasina, 120, 207; tincta, 43, 207, 265
Aporia cratægi, 19, 42, 50, 129, 202
Aporophyla australis, 307; lutulenta, 138
Arachnidæ, 283
Arctia caia, 131, 232, 233, 284, 304; lubricipeda, 235; villica, 65
Argynnis adippe, 61, 258, 260, 312; aglaia, 86, 87, 144, 194, 203, 231, 232, 258, 312; latona, 162; paphia, 58, 61, 131, 194, 203, 301, 312; selene, 203
Arsilonche albovenosa, 235
Asphalia flavicornis, 92, 163, 182, 211, 268, 341; ridens, 85, 234, 305, 341
Aspilates citraria, 87; ochrearia, 134, 314, 340; strigillaria, 341
Aspis udmanniana, 134
Asteroscopus cassinea, 120; sphinx, 120, 134, 235
Asthena blomeri, 60, 61, 170, 260; luteata, 170, 207, 235, 313; sylvata, 170
Asymmetry in Coleoptera, 22
Ateuchidæ, notes on, 37
Ateuchus, a revised classification of, 218
Autumnal emergence of Arctia caia, 312; Phorodesma smaragdaria, 307; feeding of larva of Argynnis paphia, 305
Aventia flexula, 88, 305, 313
Axylia putris, 19, 62, 118

Bactra lanceolana, 88, 209
Bapta temerata, 171
Bedfordshire—Deiopeia pulchella, 308
Berkshire—Colias edusa, 281, 282, 308; Notes from Reading, 182; Plusia moneta, 256
Berytus crassipes, 312
Boarmia abietaria, 86, 134, 258; cinctaria, 340; Gemmaria var. perfumaria, 170; repandata, 66,—var. conversaria, 134; roboraria, 85, 284, 341
Bombus derhamelus, 67
Bombyx castrensis, 42; attempt to cross

with alpicola, 89; quercus, 283; rimicola, 150; rubi, 206, 301; trifolii, 16, 56 (food-plant), 277
Botys asinalis, 133; chermesinalis, 135
Brachytron pratense, 207
Breeding Arctia caia for varieties, 334
Brenthus anchorago, 183
Brephos notha, 305; parthenias, 120, 182, 234
Broscus cephalotes, 281
Bryophila algæ, 203; glandifera, 296; muralis, 305
Butalis fusco-ænea, 208
Butterflies of Barbados, 175; geographical distribution, 135; of Hong Kong, 186

Callicera ænea, 279
Calligenia miniata, 59, 86, 296
Callimorpha dominula var. persona, 63, —var. romanovi, 63; hera, 166, 211, 290, 301
Callocampa exoleta, 92, 120; solidaginis, 120, 265; vetusta, 120
Callosamia promethea, 22
Calophasia platyptera, 135
Calopteryx splendens, 207; virgo, 345
Calotermes, two species of, 209
Calymnia affinis, 119, 134; diffinis, 58, 119; pyralina, 119
Camptogramma fluviata, 172; gemmata, 172
Cannibalism of larva of Cerastis vaccinii, 367
Caradrina alsines, 118, 134, 157; ambigua, 18, 64, 67, 92; blanda, 86, 87, 258; exigua, 135; superstes, 67, 132, —not British, 17; taraxaci, 118, 158
Caraphractus cinctus, 210
Carpocapsa pomonana, 314; pomonella, 345
Carsia paludata, 173
Catocala fraxini, 43, 132, 308, 336; nupta, 62, 87, 307, 313; attracted by Cossus, 287
Catoptria aspidiscana, 209
Celæna haworthii, 156, 269, 305, 345
Cerastis erythrocephala, 274; ligula, 273
Cerigo matura, 118
Ceroplastes iheringi, sp. n., 100
Charæas graminis, 11, 21, 62, 87, 133, 184
Charagia celsissima, sp. n., 116; coreeba, sp. n., 116; eximia, 115; lewini, 115; lignivora, 115; ramsayi, 115; scotti, 115; splendens, 115; walsinghami, sp. n., 116
Chariclea umbra, 120
Chariea cyanea, 184
Chauliodes illigerellus, 88
Cheimatobia boreata, 171, 134, 301
Chelostoma florisomne, 260
Chelura bifasciata, 64
Cherias spartiata, 19, 173
Cheshire — Cœnonympha typhon, 257, 266; early moths, 163; Lepidoptera of Macclesfield, 266; Polia chi var. olivacea, 266, 283, 335
Chœrocampa celerio, 51, 57, 66, 203, 345; nerii, 203; porcellus, 34, 206
Chrosis bifasciana, 55
Chrysomela gœttingensis, 283
Chrysomelinæ, new species of, 189
Chrysophanus dispar, 203, 231, 232
Cidaria associata, 62, 134, 172; basochesiata, 135; dotata, 172; fluviata, 135; immanata, 62; miata, 62, 133, 172, 341; picata, 296; prunata, 172; psittacata, 60; pyraliata, 61; reticulata, 55, 307; riguata, 135; silaceata, 134; suffumata, 307
Cirrhœdia xerampelina, 62, 119
Classification of Lepidoptera, a new, 318
Cleodora cytisella, 88
Cleora glabraria, 133, 138; lichenaria, 134, 135, 170; viduaria, 132, 231
Coccidæ, three new species, 100; from Jamaica, 210
Coccyx cosmophorana, 208; vacciniana, 209
Cocoons, curious cluster of, 187
Cœnonympha davus, 257, 267, 298; typhon, 257, 267, 277, 298
Coleophora, aberration in, 125; at light, 62, 63
Colias edusa, 34, 41, 50, 87, 151, 166, 194, 202, 208, 257, 258, 263, 281, 283, 308, 309, 337, 346; productiveness of, 263; late specimens, 337; hyale, 41, 42, 50, 158, 203; re-arrangement of the genus, 166
Collecting in Argyleshire, 20; in the Cotswolds, 338; Gloucestershire, 60; North Staffordshire, 206; Scotland, 132; Switzerland, 132; Wales, 161; in the South, 340; in 1895, 341
Collection of beetles, sale of the Lethierry, 90
Colour-changes in Plusia chrysitis, 204, 229
Coprophagous Lamellicorns, 37
Cordiceps robertsii, 173
Cordulia ænea, 207
Coremia minutata, 300
Cornwall—Colias edusa, 281; Sphinx convolvuli, 311, 336
Corycia taminata, 59; temerata, 36, 59
Cosmia affinis, 86, 87; diffinis, 313; fulvago, 119; paleacea, 119, 346
Cosmopteryx orichalcella, 88
Cossus ligniperda, 52, 83, 134, 338, 340
Crabro anxius, 211; dimidiatus, 284; palmipes, 235; pubescens, 211; quadrimaculatus, 67; varius, 211
Crambites, notes on, 339

Crambus ericellus, 137; falsellus, 162; inquinatellus, 134; latistrius, 42; pinetellus, 314; warringtonellus, 162
Criorrhina asilica, 235
Crymodes exulis, 131, 231
Cryptocephalus aureolus, 235; coryli, 43; nitidulus, 235
Cryptostetha cyaneo-fasciata, sp. n., 193
Cucullia asteris, 233; chamomillæ, 120; gnaphalii, 132; umbratica, 120; verbasci, 120
Cymatia coleopterata, 211
Cymatophora fluctuosa, 22, 131, 260; ocularis, 131; or, 260
Cymindis vaporariorum, 236
Cynips kollari and their various occupants, the galls of, 46

Dasycampa rubiginea, 59, 134, 182, 274
Dasychira abietis, 145
Dasypolia templi, 119, 145, 300
Deilephila euphorbiæ, 131; galii, 51, 131, 213; livornica, 165, 206, 232
Deiopeia pulchella, 51, 162, 166, 279, 308
Demas coryli, 60, 133, 338
Derbyshire — Catalogue of the Micro-Lepidoptera, 49, 117, 170
Deuterocampta transverso-fasciata, sp. n., 192
Devonshire — Catocala fraxini, 336; Colias edusa, 282, 308, 337; Deilephila livornica, 206; moths at light, 133; notes from Paignton, 133; Sphinx convolvuli, 280, 311; Syrphus annulipes, 284; Xylina semibrunnea, 308; petrificata, 308
Dianthœcia albimacula, 132; carpophaga, 259; cæsia, 331; conspersa, 138; cucubali, 35, 119; luteago, 328; nana, 283
Diary of an entomologist, irregular, 40
Dicranura bicuspis, 52, 131, 231; bifida, 18, 52, 62
Dicycla oo, 258, 260
Didea alneti, 347; fasciata, 347
Diphthera orion, 85, 117
Diptera, 67
Dipterygia scabriuscula, 207, 264, 284
Dismorphia fortunata, 138
Dorsetshire —Colias edusa, 258; notes from, 258; notes from Poole, 163; Sphinx convolvuli, 312
Doryphora, new species of, 189; bartletti, 191; mathami, 190; peruana, 190; piceo-maculata, 191; sanguinipennis, 189; semifulva, 192
Dragonflies in Sussex, 57; the earlier, 207; unusual pairing, 279
Drepana binaria, 62; hamula, 60, 204; sicula, 131, 231
Durham — Acherontia atropos, 309; Polia flavicincta, 308
Dytiscus marginalis, female resembling male, 183; picture seen through cornea, 347

Early appearance of Phigalia pedaria, 99; spring lepidoptera, 162
Echinomyia grossa, 347
Editorial, 69
Effects of cold on certain species of Vanessa, 54; of temperature in producing variation, 184
Egg-parasite, an, 283
Elachista gleichenella, 88; paludum, 88
Elater balteatus, 212; elongatulus, 235
Ellopia fasciaria, 258
Ematurga atomaria, 259
Emmelesia affinitata, 162, 171; alchemillata, 162, 171, 271; minorata, 162; tæniata (fig. of larva), 141, 171, 347; unifasciata, 88
Emydia cribrum var. candida, 344
Enallagma cyathigerum, 217
Endromis versicolor, 149, 182
Ennomos alniaria, 62; angularia, 138, 170; canaria, 61; erosaria, 87; fuscantaria, 19, 59, 170, 314; tiliaria, 19, 170
Ennychia cingulata, 162; octomaculata, 209
Entomological Club, the, 84
Entomological queries and specific stability, 185
Ephyra orbicularia, 60
Epigraphia steinkellneriana, 133
Epinephele hyperanthes, 17, 260; ianira, 260, 301
Epione advenaria, 60
Epping Forest, notes from, 258
Epunda lutulenta, 299; nigra, 60
Erebia æthiops, 67; observations on, 297; nerine, 343; tyndarus, 66
Eriocolias, gen. n., 167
Eristalis tenax, 137
Errata, 348
Essex—Colias edusa, 308; notes from Epping Forest, 258; Plusia moneta, 310
Eubolia cervinaria, 19; cervinata, 134, 172; palumbaria, 60
Euchloë cardamines, small form of, 63; vars., 130, 158
Eucosmia certata, 172; undulata, 159
Eugonia alniaria, 22; autumnaria, 307; erosaria, 170; fuscantaria, 62, 313, 341; tiliaria, 341
Eupistera heparata, 170, 235; obliterata, 170
Eupœcilia geyeriana, 88
Eupithecia absynthiata, 134; albipunctata, 172; assimilata, 172; constrictata, 161; denotata, 172; fraxinata, 172; haworthiata, 171; isogrammata, 85, 171; linariata, 171; minutata, 172,—var. knautiata, 211; pimpinellata, 172;

plumbeolata, 171; pulchellata, 134, 300; pumilata, 135; pygmæata, 171; subfulvata, 86, 171, 271; sobrinata, 172; subumbrata, 163; tenuiata, 260; togata, 43; trisignata, 172; valerianata, 172, 259; venosata, 36, 161, 171, 271
Eurrhypara urticata var., 66
Eurymene dolobraria, 19, 60, 63, 85, 170, 259
Exhibition, South London Entomological and Natural History Society's, 300, 303

Fœnus assectator, 45
Foreign Periodicals, 21, 164
Fulgoridæ, luminosity of the, 186
Fumea intermediella, 301
Fungoid growth on Hepialus, 91
Fungus-eating ant, a, 64

Galleria alvearia, 42
Geometra papilionaria, 61, 134, 170, 259, 270, 341
GLOUCESTERSHIRE — Nyssia hispidaria, 134; Sphinx convolvuli, 336
Gnophos obscurata, 296
Gnophria quadra, 51; rubricollis, 42, 134, 338, 341
Gonopteryx rhamni, 257
Grapholitha obtusana, 219
Grapta c-album, 60, 307
"Grease-band" and Cheimatobia brumata, 64
Grease in moths, 303
Gynandromorphous Argynnis paphia, 92; Pieris brassicæ, 312
Gynopleurus, correction of nomenclature, 2

Habrostola tripartita, 44, 120
Hadena adusta, 299; contigua, 340; dissimilis, 207; genistæ, 207; glauca, 120; oleracea, 260; suasa, 138; trifolii, 62, 120
Halias prasinana, 88; quercana, 84, 85, 86
HAMPSHIRE — Colias edusa, 337; notes from New Forest, 258; Mallota eristaloides and M. hyalinatum, 279; Rhopalocera of Fleet, 194
Hecatera chrysozona, 305
Helophilus frutetorum, 260; transfugus, 260
Heliophobus hispidus, 59; popularis, 19
Heliothis armigera, 233; dipsaceus, 120; peltigera, 136
Hemiptera-Heteroptera, 312
Hepialidæ, Australian, 114
Hepialis humuli, 204; velleda, 268
Hermaphrodites: Bombyx castrensis, 42; Gonopteryx rhamni, 204; Pieris napi var. bryoniæ, 258; Saturnia carpini, 164
HERTFORDSHIRE — Colias edusa, 309; Sphinx convolvuli, 311
Hesperia actæon, 187; comma, 336; lineola, 86
Hessian fly, cocoon of the, 90
Heterogenea asellus, 204; testudo, 204
Heterogynus penella, 135
Himera pennaria, 134, 170
Hippobosca equina, 260
Hister purpurascens, 212
"Honey" ants, 210
Hoporina croceago, 22
Hübner's works, reissue of, 22
Hybernia aurantiaria, 124; defoliaria, 66, —in March, 181,—in December, 89; leucophæaria in January, 134
Hybrids: Saturnia pavonia,—pyri, 43; Platysamia cecropia,—gloveri, 343
Hydrelia uncula, 230
Hydrilla palustris, 64, 67, 232
Hydrœcia nictitans, 87,—var. paludis, 204, 342
Hygrocarabus variolosus, 125
Hymenoptera at light, 62, 63
Hypena rostralis, 62, 87
Hypenodes albistrigalis, 134; costæstrigalis, 58, 265
Hypsipetes elutata, 299; impluviata, 172; ruberata, 172; sordidata, 299; trifasciata, 172

Idioptera pulchella, 67
Incurvaria tenuicornis, 64
Ino geryon, 51
Insects: in birds' stomachs, 138; sense organs, 30, 278, 304; fertilise Medicago, 54; at light, 61, 313; most variable, 255
Iodis vernaria, 86
IRELAND—Catalogue of the Lepidoptera, 180, 195, 216, 250, 272, 327; Acherontia atropos, 280; Amphidasys betularia, 18; Sphinx convolvuli, 311
Ischnura elegans, 207, 208
Ithonia patilla, 138
Izal and relaxing boxes, 130

Jumping beans and jumping eggs, 52, 82, 83, 159, 229

KENT—Catocala fraxini, 307; Colias edusa, 257, 282, 309, 337; Eugonia autumnaria, 307; Leucania albipuncta, 281, 308; Plusia moneta, 232, 256; Sphinx convolvuli, 281; Vanessa, c-album, 307
Kermes gillettei, sp. n., 101
Killing and preserving insects, 205, 331

Lælia cœnosa, 131, 138, 203, 231
LANCASHIRE—Coccyx cosmophorana, 208; Hesperia comma, 336
Larentia cæsiata, 171, 296, 301; olivata,

296, 341; ruficinctata, 299; silicata, 171
Larva, of Abraxas grossulariata abundant, 89; of Acronycta in June, 229, 305; of Argynnis paphia feeding in autumn, 305; Eupithecia fulvata, 271; of Hysipetes (for Ypsipetes) ruberata, 89; of moth feeding on secretion of a coccid, 218; of Sphinx convolvuli, 311, 336; in Surrey and Kent, 338
Larval life of Stauropus fagi, earlier, 276
Lasiocampa ilicifolia, 131; quercifolia, 312, 314
Late season, 187
Lepidoptera, Belgian and British, 22; of the British Islands, notes on various species included in Mr. Barrett's book, 165; of the Bloxworth district, 87; at Chichester, 313; of Derbyshire, 49, 117, 170; at Freshwater, rare, 18; of Ireland, 13, 79, 155, 180, 195, 250, 272, 327; at light, 18, 61; of the Macclesfield district, 266; of Middlesex, 304; of Orkney, 298; of Salisbury, 312
Leptogramma literana, 133
Leptomorphus walkeri, 343
Leucania albipuncta, 18, 67, 131, 281, 308
Leucanium perforatum, 68
Leucomia salicis, 86
Leucophasia sinapis, 182, 194
Leucorrhinus dubica, 283
Libellula quadrimaculata, 204, 207
Ligdia adustata, 171
Light: insects at light, 313; Coleoptera, Diptera, Heteroptera, Hymenoptera, 314; Lepidoptera, 313; Neuroptera, 314; Vanessa urticæ attracted by, 233
Limacodes testudo, 85
Limenitis sibylla, 41, 213, 225
Limnobia nigropunctata, 67
Lincolnshire—Acherontia atropos, 336; Sphinx convolvuli, 336
Liparis monacha, 59; Salicis in London district, 19, 83
Lithosia aureola, 85; caniola, 231; griseola, 235; lurideola, 161, 301; lutarella, 137; mesomella, 34, 305; muscerda, 22, 284
Lobophora carpinata, 134; halterata, 172, 234; hexapterata, 172; lobulata, 182; polycommata, 36, 314; sexalisata, 234; viretata, 207, 301, 342
Lomaspilis marginata, 301
Lucanus cervus, 125
Luminous species of Pyrophorus, 344
Luperina cespitis, 35, 61, 134; dumerili, testacea, 37
Lycæna acis, 231; adonis, 85; ægon, 259, 345; argiolus, 59, 152; (P.) arion, 45, 231, 301; astrarche, var. salmacis, 209; bellargus, 235, 283; corydon, 212; dispar, 42; minima, 50, 152
Macaria alternata, 60; liturata, 36, 85, 171, 259; notata, 44, 207
Macroglossa bombyliformis, 260; fuciformis, 33, 85, 233, 340
Macrolepidoptera of the Burghclere district, 33
Mallota eristaloides (for cristaloides), 257, 279
Mamestra albicolon, 13; furva, 13, 118; persicariæ var. unicolor, 211; sordida, 62, 118
Margarodes unionalis, 316
Mecomma ambulans, 312
Mecyna polygonalis, 316
Melanippe galiata, 86, 172; hastata, 85, 128, 172, 207, 260; montanata, 300; rivata, 296, 303, 341; unangulata, 36, 88
Melanostoma hyalinatum, 279; scalare killed by fungus, 235, 260
Melanthia albicillata, 85, 172, 207
Meliana flammea, 235
Melitæa artemis, 33, 194, 203, 267; athalia, 85, 213, 339; aurinia, 50, 194, 267, 301; cinxia, 203
Melolontha fullo, 41
Merodon equestris, 343
Mesogona acetosellæ, a noctuid moth new to Britain, 317
Mesophylax asperus, 314
Miana arcuosa, 81, 118; bicoloria, 81; fasciuncula, 80; literosa, 86, 118; strigilis, 79, 260
Middlesex—Colias edusa, 208; Lepidoptera of, 208, 304; Macroglossa fuciformis, 233; Plusia moneta, 311; season in North, 58
Mimetic patterns in butterflies, the growth of, 91
Minoa euphorbiata, 61
Monochammus sutor, 16
Moth adipocere, 76
Moth-trap, the illuminated, 133
Myleophila cribrum, 235
Myrinus mirifrons, 312
Myrmosa melanocephala, 284

Nascia cilialis, 235
Nebria complanata, 347
Nemeobius lucina, 85, 88, 194, 203; second brood, 338
Nemeophila plantaginis, 51, 61
Nemoria viridata, 340
Neottiglossa inflexa, 312
Nephopteryx spissicella, 134
Neuria reticulata, 118; saponaria, 21, 35, 118
Neuronia popularis, 118, 134
Newspaper entomology, 230, 256
Nickel entomological pins, 21
Noctua augur, 200—var. helvetina, 118; brunnea and vars., 211; castanea, 250; c-nigrum, 201; dahlii, 20, 35,

86, 118, 265, and vars., 216; depuncta, 134, 136, 283; ditrapezium, 201; festiva, 299, and vars., 211; glareosa, 21, 118, 265, 269, and vars., 200; plecta, 201; rhomboidea, 307; rubi, 87, and vars., 216; sobrina, 250; subrosea, 118, 130, 131, 232; stigmatica, 307
Noctuid moths, synonymy of, 120, 222, 275
Nola albulalis, 131, 301; centonalis, 131; confusalis, 51, 206, 305
Nomada flavoguttata, 283; ochrostoma, 283; ruficornis, 283
Nonagria brevilinea, 131, 284; lutosa, 118; sparganii, 131; typhæ, 87
Notodonta carmelita, 204; chaonia, 19, 44, 52, 62, 182, 204; dictæa, 131, 138; dictæoides, 52, 58, 134, 314; dodonea, 52, 131, 204; trepida, 133, 234; trimaculæ, 134; ziczac, 231
NORFOLK—Colias edusa, 319
NORTHUMBERLAND — Sphinx convolvuli, 280
NOTTINGHAMSHIRE—Stilbia anomala, 279
Nudaria senex, 314
Nyssia hispidaria, 58, 62, 84, 134, 162, 163, 170, 182, 187, 341; lapponaria, 163, 207, 307; life-history, 237; pomonaria, 181

OBITUARY — Adye, J. Mortimer, 164; Still, Major John N., 315; Tugwell, William Henry, 284, 315; White, Francis Buchanan, 24
Ocneria dispar, 131
Œcophora flavifrontella, 209; woodiella, 210
Œdematophorus lithodactylus, 62
Onthophagus, correction of nomenclature, 221; notes on, 178
Oporabia dilutaria, 301, 347
Oporina croceago, 59, 274
Orgyia gonostigma, 182, 208
Ornithoptera richmondii, life-history of, 93
Orthoptera, notes on, 333
Orthosia lota, 272; macilenta, 119; suspecta, 86, 138, 265, 270, 272, 283
OXFORDSHIRE—Orgyia gonostigma, 182

Pachetra leucophæa, 348
Pachnobia hyperborea, 252, 300; rubricosa, 252, 340
Pachycnemia hippocastanaria, 182, 234, 340
Pancalia lewenhoekella, 88
Panchlora maderæ, 346
Panolis piniperda, 134
Papilio anticorates, 138; bairdii, 139; epycides, 138; machaon, 50, 102, 104, 187, 301; memnon, 138; pammon, 138; podalirius, 41; segonax, 138; serostris var. xestos, 259; westwoodii, 138
Paraponyx stratiotalis, 62
Pararge egeria, 66, 258; megæra, 66
Parateuchus, gen. n., 221
Pechypogon barbalis, 85
Pempelia palumbella, 134
Penthina postremana, 55
Pericallia syringaria, 63
Periplaneta americana in Kew Gardens, 257; orientalis at light, 62
Peronea comparana, 134; sponsana, 134
Petasia cassinea, 61, 85
Phibalapteryx lapidata, 21, 68; lignata, 235, 296; polygrammata, 132, 231; tersata, 61, 62; vitalbata, 61, 86, 313; vittata, 172, 314
Phigalia pedaria, 66, 187, 270
Phorodesma bajularia, 170; pustulata, 170; smaragdaria, 43, 44, 129, 132, 160, 259, 283; in autumn, 307
Phothedes captiuncula var. tincta, 155
Phoxopteryx diminutana, 88; siculana, 88, 209; subarcuana, 88
Phycis carbonariella, 314; roborella, 314
Phycita abietella, 88
Physokermes coloradensis, sp. n., 101
Pierinæ, a new species of, 166
Pieris daplidice, 41, 231, 337; rapæ in New Mexico, 304
Pigments of the Pieridæ, the, 1
Pins, nickel entomological, 21
Platetrum depressum, 204, 208
Platycnemis pennipes, 208
Platypteryx hamula, 85, 87
Plusia bractea, 270; chrysitis, 120, 159, 204,—colour changes, 181, 229; festucæ, 120, 265; gamma, var., 66; interrogationis, 120; iota, 19, 21, 120, 265; moneta, 18, 22, 256, 310, 311,—observations on, 261; pulchrina, 21, 120, 265
Pœcilocampa populi, 52, 84, 134, 235, 305
Pœdisca profundana, 134
Polia chi, varieties of, 66,—var. olivacea, 283; flavicincta, 281; nigricincta, 92, 132
Polygamy in moths, 22
Polynema nutans, 187, 210
Polyommatus dispar, 131; phlœas, vars., 66, 131
Polyphylla fullo, 41
Polyporus for staging insects, 183, 230, 255
Pompilus viaticus, 212
Prionus coriarius, 283
Procris geryon, 60
Pronuba yuccasella, 137
Protective resemblance of Lobophora viretata, 301

Pseudocercobotra wahlbergi, 183
Pseudodoxis limulus, 343
Pseudoterpna cytisaria, 132; pruinata, 170
Psilura monacha, 85
Psyche opacella, 182, 301; species from Argentine Republic, 283
Pterophorus bertrami, 314
Pterostichus lepidus, 236; madidus, attacked by a Gordius, 187
Pterostoma palpina, 52, 63, 134, 314
Ptilodontis palpina, 19, 34
Pygæra curtula var., 231
Pyralis glaucinalis, 62
Pyrrhosoma minium, 207, 209; tenellum, 207

Recent Literature:—
  'Abstract of Proceedings of the South London Entomological and Natural History Society for the year 1894,' 212
  'A Plum-scale in Western New York,' by M. V. Slingerland, 188
  'A Manual for the Study of Insects,' by John Henry Comstock, 236
  'Butterflies and Moths (British),' by W. Furneaux, F.R.G.S., 68
  'L'Amateur de Papillons,' by H. Coupin, 188
  'Report of Observations of Injurious Insects, 1894,' by Eleanor A. Ormerod, 139
  'The Cabbage-root Maggot: with Notes on the Onion Maggot and Allied Insects,' by M. V. Slingerland, 140
  'Wayside and Woodside Blossoms,' by Edward Step, 188
  Wytsman's Re-issue of Hübner's Works on Exotic Lepidoptera, 22
Reports of Societies:—
  Birmingham Entomological, 67, 91, 138, 187, 211, 235, 260, 283, 347
  Entomological of London, 63, 64, 65, 90, 135, 183, 209, 342
  Chester, of Nat. Science and Literature, 347
  Lancashire and Cheshire Entomological, 67, 92, 138
  Nonpareil Entomological, 260, 284, 348
  North London Natural History, 234
  Reading Natural History, 68
  South London Entom. and Nat. Hist., 65, 66, 67, 91, 136, 186, 211, 235, 259, 282, 345
Retinia pinicolana, 88, 133
Rhagium bifasciatum, 186, 212
Rhodia fugax, 218
Rhodophœa consociella, 162; marmorea, 134
Rhopalocera, profusion in the Alps, 286; vertical distribution in the Alps, 322; African, 153; effect of glacial period on distribution, 247; of Fleet and district, 194; in Guildford district, 150; origin of European, 247
Rumia cratægata, 138; luteolata, 282

Sales at Stevens's:—Machin, 130, 158, 202; O'Reilly, 202; Robson, 203, 307; Wheeler, 230
Saturnia boisduvalii, 150; pavonia, 149, 268
Sawfly with eight legs, 137
Scodonia belgiaria, 234, 283, 340, 341
Scolytus rugulosus, 67
Scoparia basistrigalis, 137; cembræ, 162
Scopula decrepitalis, 68
Scotland — Chœrocampa celerio, 308; Cœnonympha typhon in West, 277; collecting in, 132; Hepialus humuli in Orkney, 204; Nyssia lapponaria, 163, 207, 237; Sphinx convolvuli, 281
Scotosia rhamnata, 84, 86, 172
Seasonal dimorphism, 185
Secretion of potassium hydroxide by Dicranura vinula, 184
Selenia illustraria, 170; lunaria, 134, 170; tetralunaria, 134
Sense organs of insects, 30, 243, 278, 304
Senta ulva, 131,—and vars., 231
Sericomyrmex opacus, 64
Sericoris ingratana, sp. n., 181
Sesia asiliformis, 51, 165; bombyliformis, 60; culiciformis, 138; cynipiformis, 51; formiciformis, 43; ichneumoniformis, 43; scoliiformis, 131, 165, 231; sphegiformis. 51, 67; tipuliformis, 45
Setting minute insects, an instrument to assist in, 301
Shropshire — Acherontia atropos, 280, 310; notes from, 339; Vanessa c-album, 280; Xanthia gilvago, 310
Sirex gigas, 259
Somersetshire — Acherontia atropos, 310
Sphinx convolvuli, 51, 280, 281, 311, 312, 313, 336; ligustri two winters in pupa, 208; pinastri, 131, 165, 232, 257, 312
Spilodes cinctalis, 314
Spilosoma lubricipeda and vars., 3, 27, 182, 301; menthastri var., 187
Staffordshire — Aplecta occulta, 284; Charæas graminis, 133; collecting in North, 206
Stauropus fagi, 22, 134, 182; double-brooded, 306
Stigmonota coniferana, 88
Stilbia anomala, 118, 134, 157
Stilodes bogotænsis, sp. n., 192

Suffolk—Colias edusa, 282, 337; Sphinx pinastri, 232, 257
Sugar, 20, 306, 338; versus natural food, 264
Surrey—Acherontia atropos, 310; Argynnis latona, 162; Colias edusa, 309, 337; Cymatia coleopterata, 211; Deiopeia pulchella, 162; Plusia moneta, 311; Prionus coriarius, 283; Rhopalocera of the Guildford district, 150; Sphinx convolvuli, 281, 336; Vanessa polychloros, 182
Sussex—Colias edusa, 282, 309, 337; Deilephila livornica, 232; Deiopeia pulchella, 279; Lepidoptera of Chichester, 313
Sylphidæ, European, 92
Synonomy of noctuid moths, 120, 222, 275
Syntomis phegea, 166
Syrichthus malvæ resembles Euchlidia mi, 152
Syrphus annulipes, 281

Tæniocampa gracilis, 229,—and vars., 253; gothica and vars., 252; incerta and vars., 253; miniosa, 254; munda, 84,—and vars., 254; opima and vars., 253; populeti, 18, 84, 119, 253; rubricosa, 299
Talæporia pseudo-bombycella, 43
Tapinostola bondii, 228
Tauronthophagus, gen. n., 179
Tenacity of life in the dragonfly, 204; in insects, 228
Tenthredopsis microcephala, 168
Tephrosia biundularia, 170, 301; consonaria, 60; crepuscularia, 170; extersaria, 260; laricaria, 170
Termites, soldiers and workers of, 185
Tethea subtusa, 35, 119, 314
Thecla betulæ, 87; pruni, 50; quercus, 194; w-album, 50
Thera firmata, 172, 348; juniperata, 298
Therioplectes tropicus var. bisignatus, 260
Thymalus limbatus, 236
Tortricina, why not collect, 215, 255
Tortrix cinnamomeana, 282; costana, 314; with larval legs, 137
Trichiura cratægi, 52, 85
Trichogramma evanescens, 283
Trimiera pilipes, 67
Triphæna comes, 119, 250,—var. curtisii, 299, subsequa, 119, 250
Triphosa dubitata, 62
Trochilium apiformes, 51, 84; bembiciformes, 84; crabroniformes, 51, 267
Troides victoriæ, a new local form of, 78
Trypeta cardui, 210, 348
Two pupæ in one cocoon, 41

Unusual pairing of dragonflies, 279

Vanessa antiopa, 41, 44, 50, 102, 109, 203, 231,—var. daubi, 110,—var. roederi, 112; atalanta, 112; c-album, 50, 57, 67, 105, 138, 280, 307; callirrhoë, 112,—var. vulcania, 112; cardui, 112, 142,—at light, 134; cyanomelas, 102; io, 107, 161; levana, var. porima, 102; polychloros, 34 50, 85, 105, 151, 182, 194, 258; urticæ, 66, 116,—var. connexa, 83, 91,—variation in Ireland, 84,—in Co. Waterford, 57
Variation in the imago stage of butterflies, causes of, 69, 102, 142; in size of Coleoptera, 210
Varietal terminology, 241
Varieties—Abraxas grossulariata, 231, 284, 300, 307; Acronycta ligustri, 138; Agrotis agathina, 199; corticea, 196; cursoria, 186, 197; exclamationis, 196; lucernea, 200; lunigera, 195; nigricans, 197; ripæ, 306; saucia, 195; tritici, 186, 197, 299; vestigialis, 180; Amphidasys betularia, 7, 18, 62, 132, 170; Anthocharis cardamines, 91; Anthrocera trifolii, 60: Apamea didyma, 15; Apatura iris, 131, 232; Epunda (Aporophyla) lutulenta, 138; Arctia caia, 131, 232, 233, 284; lubricipeda, 235; villica, 65; Argynnis adippe, 260; aglaia, 203, 231, 232; paphia, 131, 301; selene, 103; Asphalia flavicornis, 92; Boarmia repandata, 66, 134; Bombyx quercus, 283; rubi, 301; Callimorpha hera, 301; Calocampa exoleta, 92; Catocala nupta, 213; Celæna haworthii, 156: Cerastis erythrocephala, 274; Cheimatobia boreata, 301; Chrysophanus phlœas, 301; Cidaria suffumata, 307; Cleora glabraria, 138; Dianthœcia carpophaga, 259; nana, 283; Ematurga atomaria, 259; Epinephele hyperanthes, 17, 260; ianira, 260, 301; Epunda lutulenta, 299; Euchelia jacobææ, 260; Euchloë cardamines, 63, 130, 158; Eubolia plumbaria, 60: Eugonia alniaria, 22; Eupithecia pumilata, 135; Gnophos obscurata, 296; Gonopteryx rhamni, 257; Hadena adusta, 299; oleracea, 260; Hybernia defoliaria, 66; Larentia cæsiata, 300; Limenitis sibylla, 213; Lithosia lurideola, 301; Lomaspilis marginata, 301; Lycæna ægon, 259; alexis, 138, 203; bellargus, 235, 283; Mamestra persicariæ, 214; Melitæa athalia, 203; aurinia, 301; cinxia, 203; Melanippe montanata, 300; Miana arcuosa, 81; bicoloria. 81; fasciuncula, 80; strigilis, 79, 260; Notodonta dictæa, 138; ziczac, 231; Ocneria dispar, 131; Oporabia dilutata, 301; Pachnobia rubricosa, 252; Papilio machaon, 187,

301; Pararge egeria, 66; megæra, 66; Phigalia pedaria, 270; Polyommatus phlœas, 66; Pseudoterpna cytisaria, 132; Rhagium bifasciatum, 186, 212; Rumia cratægata, 138; luteolata, 282; Smerinthus tiliæ, 259; Tephrosia biundularia, 301; Thera juniperata, 346; Vanessa atalanta, 203; cardui, 131; polychloros, 92; urticæ, 67, 203, 301, 312; Xanthia aurago, 138; fulvago, 270
Variety, form, race, and aberration, 213
Vegetable caterpillars, notes on the New Zealand, 273
Venusia cambrica, 162, 233

Wales—Collecting in, 161; Sphinx convolvuli, 336; Venusia cambrica, 233
Why not collect Tortricina, 215, 255
Wiltshire — Colias edusa, 282; Lepidoptera of Salisbury, 312; Sphinx pinastri, 312
Wood naphtha as a relaxing medium, 56
Worcestershire—Catocala nupta, 307

Xanthia aurago, 133, 138, 274; citrago, 119; gilvago, 19, 91, 119, 274, 281, 307, 314; ocellaris, 132, 137, 345
Xylina conformis, 132, 308; petrificata, 308; semibrunnea, 307, 313, 346; socia, 305; zinckenii, 345
Xylomiges conspicillaris, 131, 204, 231
Xylophasia scolopacina, 118; sublustris, 118

Yellow and other varieties of Zygæna trifolii, 214

Zelleria insignipenella, 88; saxifragæ, 25
Zelotypia stacyi, 115
Zeuzera pyrina, 52
Zicrona cærulea, 346
Zygæna exulans, 8, 25, 283, 316; filipendulæ, 91, 131; loniceræ, 51, 64, 301; meliloti, 212; minos, 165; trifolii, 67, 85, 131, 214; vanadis, 11

ILLUSTRATIONS.

PAGE

Plate I.—Nyssia lapponaria . . . . *facing* 237

Portrait of Dr. F. B. White . . . . ,, 25

Pupa and Ova of Ornithoptera richmondii 93

Malformations of Appendages in Coleoptera 126

Larva of Emmelesia tæniata 141

Mesogona acetosellæ 317

THE ENTOMOLOGIST

Vol. XXVIII.] JANUARY, 1895. [No. 380.

THE PIGMENTS OF THE PIERIDÆ: A CONTRIBUTION TO THE STUDY OF EXCRETORY SUBSTANCES WHICH FUNCTION IN ORNAMENT.*

By F. Gowland Hopkins,

Demonstrator of Physiology and Chemistry at Guy's Hospital, London.

The paper deals with the chemistry of the wing pigments of that group of butterflies known as the Pieridæ, and demonstrates the excretory nature of these pigments. The following are the salient facts dealt with, most of the statements being based on original observations described in the paper:—

1. The wing scales of the white Pieridæ are shown to contain *uric acid*, this substance bearing the same relation to the scale as do the pigments in the coloured Pieridæ, and therefore functioning practically as a white pigment.

2. The yellow pigment which is so widely distributed in the Pieridæ (being found in the majority of the genera) is shown to be a derivative of uric acid.

3. The properties of this yellow pigment are described, and the results of its analysis are given. The pigments of various yellow-coloured genera are shown to be identical.

4. It is shown that this yellow pigment may be artificially produced by heating uric acid with water in sealed tubes at high temperatures. The product so obtained was originally described by Hlasiwetz as "mycomelic acid"; but evidence is brought forward to show that the substance described and analysed by this chemist was in reality urate of ammonium coloured by a yellow body, probably identical with the natural pigment.

5. The identity of the natural and artificial products is demonstrated by the fact that both yield under like treatment a purple derivative, which has a well-marked and easily identified absorption spectrum.

---

* Abstract of a Paper read before the Royal Society.

6. The artificial yellow product has not yet been obtained in a pure condition, but it may be so far purified as to exhibit clearly all the general properties of the natural pigment.

7. The natural pigment as prepared for analysis is shown to be almost certainly a chemical individual. Its probable constitution is discussed.

8. It is shown that this yellow substance (denominated in the paper "Lepidotic acid"), together with a closely allied red substance, will account for all the chemical pigmentation of the wing scales of the coloured Pieridæ, though modifications may be produced by superadded optical effects. The black pigment found in the group is not dealt with in the paper.

9. The described uric acid derivatives, though universal in the Pieridæ, are apparently confined to this group among the Rhopalocera. This fact enables the interesting observation to be made, that where a Pierid mimics an insect belonging to another family, the pigments in the two cases are chemically quite distinct. This is well seen in the genera *Leptalis* and *Mechanitis* respectively.

10. The existence of pigments other than scale-pigments is for the first time described; substances, namely, which are found between the wing membranes, and which, in certain genera, are the basis of ornament.

11. The fact that the scale-pigments are really the normal excretory products of the animal used in ornament, is emphasised by the observation that the yellow Pierids, on emergence from the chrysalis, are apt to void from the rectum a quantity of uric acid coloured by a yellow substance which exactly resembles the pigment of the wing.

GYMNOPLEURUS; CORRECTION OF NOMENCLATURE.

By John W. Shipp.

Gymnopleurus, Illiger.

Modestus, Lansberge, Notes, Leyden Mus. 8, p. 72, 1886.

Peringueyi, mihi = *modestus*, Pery, Tr. Sth. Afr. Phil. Soc. iv. p. 94, 1888.

Peringueyi, Shipp (*modestus*, Pery *nec* Lansb.). — Nigrocyaneous, opace. Head granulose, a little broader than long, rounded at base, produced angularly laterally, and with an acute ridge on each side; clypeus with the outer margin slightly reflexed, deeply emarginated in the centre, which thus forms two moderately acute teeth; antennæ black. Prothorax convex, once and a half broader than long, with the sides rounded and slightly angulated in the centre, marginated and finely granulose, without any lateral fovea. Elytra finely granulose, strongly developed at the shoulders, deeply striated. Pygidium depressed, carinated at base, and deeply shagreened. Under side very dark blue, shagreened; anterior femora with a median tooth underneath; anterior tibiæ tridentate.

Hab. Beaufort West, Cape Colony. Long. corp. 12–13 mm., lat. 6 mm. Type in Sth. Afr. Mus.

Modestus, Lansb.—"Obscure rubro-cupreus, supra rugulosus, clypeo bidentato, thorace obsolete lineato, elytris obsolete striatis, sinu laterali valde profundo." Long. corp. 8–12 mm.

Hab. Benguela.

I may mention that Peringuey's description was *read* on March 31st, 1886, the same year as Lansberge described his species.

G. modestus is very closely allied to *G. cupreus*, Boh., but is more brilliant, and more distinctly granulated.

Oxford, 1894.

SPILOSOMA LUBRICIPEDA AND ITS VARIETIES IN YORKSHIRE, DURHAM, LINCOLNSHIRE, &c.*

By W. Hewett.

I hope that the following particulars, obtained from many sources and from a careful examination of most of the Yorkshire and Durham collections (not merely once, but often on two or three occasions), will tend to throw a little light on this somewhat dark question, which has already been discussed at some length by Messrs. Porritt, South, and Tugwell (Entom. xxvi. 247, 257, 296, 346; xxvii. 129, 205). The type of *S. lubricipeda* is generally distributed, and, I believe, common in most localities, although, like many other species, it occurs in much greater abundance in some seasons than in others. Mr. Finlay, of Meldon Park, Morpeth, when looking over my collection a short time ago, informed me that the species is rare in all stages in the neighbourhood of Morpeth. The larvæ, when full-fed and about to pupate, are not by any means particular in the choice of their abode—such unlikely places as old kettles, pots and pans of all descriptions, pieces of brown paper, newspaper, old rags, the stalk of a cabbage, or in the pithy branches of the elder; and I have heard of from twelve to sixteen cocoons being taken from one cabbage-stump. The egg, larva, pupa, and the ordinary forms of the imago are too well known to need any description, so I will at once proceed to the chief feature of this paper, *viz.*, a description of the principal varieties which are known to occur.

---

* Abstract of a Paper read before the Lancashire and Cheshire Entomological Society, Nov. 12th, 1894.

Var. *radiata*.—In addition to the specimen figured in Westwood and Humphrey's 'British Moths,' plate xviii. figure 19, 1843, which was taken in Yorkshire, and that figured by Newman in the 'Entomologist,' vol. vii. 169 (1874), stated to have been sent to him by Mr. Dawson, of Driffield, there is an example in the Allis collection at the York Museum, which I had the pleasure of examining in company with Mr. S. J. Capper, on October 19th. This specimen, although not so dark as some of the choicest forms of *radiata* lately bred by Messrs. Harrison, Young, Tugwell, and Porritt, is to all intents and purposes identical with them, and exactly corresponded with some two dozen specimens of *radiata* which Mr. S. J. Capper had with him on that occasion. There is neither date, locality, nor name of captor affixed to this or indeed to any of the specimens in the collection, but I think it can be taken for granted that it is a York or Yorkshire specimen. The only other record that I have been able to obtain of *radiata* having occurred in Yorkshire, previous to the introduction of Mr. Harrison's fine form in 1891, is that of three specimens which were taken at rest, not bred, by Mr. Sweeney, at Driffield, some twelve or fifteen years ago. These specimens, which I have seen on three separate occasions, are smaller than those bred by Mr. Harrison, but identical in every other particular with specimens sent to me by Messrs. Porritt and Tugwell, and with which I compared them. They are in fair condition, decidedly aged, and set on household pins. As far as I am aware I do not see any reason for doubting their authenticity, which I think is beyond dispute. Thus we have records of six specimens of *radiata* having been taken or bred in Yorkshire previous to 1891, and I am firmly convinced, that had the works of Darwin and Wallace been more widely read, and the principles of heredity and artificial selection therein explained better understood and acted up to, we should not have had to wait until 1891 to see this truly grand form bred for the first time in England as the result of artificial selection.

Mr. Harrison, of Barnsley, whose fine and extensive series of *radiata* and intermediate forms I have had the pleasure of seeing, and to whom I wrote for particulars of the variation of *S. lubricipeda* in his district, says:—"I do not remember ever breeding *S. lubricipeda* in any form previous to 1891; in fact my series had been picked up casually and were only the ordinary form, neither *radiata*, *eboraci*, nor *fasciata*; and I distinctly say that not any of these three forms occur in this district to my knowledge, neither in a wood nor any weedy garden, as reported [see 'Entomological Transactions' (London), part 4, November meeting, 1892, page xxix, for my original and true history]. My original male was of that form [*fasciata*], and would no doubt be one of the Grimsby pupæ, as I selected the strongest-marked specimen that I had out at the time the female *radiata* came out to pair with. I have kept the original parents."

Mr. Young, of Rotherham, to whom as also to Mr. Harrison, of Barnsley, many of us are indebted for our series of *radiata*, replying to a similar query of mine *re* variation of the species at Rotherham, says:—"I have not bred any variety of *S. lubricipeda* from larvæ collected in this district, in any way approaching to var. *fasciata* or *eboraci*; the form here is very plain, and almost without markings." Mr. J. Bloor, also of Rotherham, confirms Mr. Young's statement. Whilst at Rotherham, on the 27th ult., Mr. J. N. Young showed me some 120 specimens of *radiata* which he had recently bred from "Harrison's strain"; also the photographs of 108 specimens. Mr. Young informed me that *radiata* pair more readily with typical wild specimens of *lubricipeda* than *inter se*, and that the offspring from this union were fertile. Much of the vitality in *radiata* seems to be lost by inbreeding; especially is this the case with the males, which are very sluggish. I have frequently heard it suggested that *radiata* is a distinct species, but the fact of there being no apparent difference in the ova, larvæ, or pupæ, and that when paired with typical wild specimens the offspring are fertile, seems in my opinion to warrant our assuming that it is a fixed variety only. There are some entomologists, I know, who take exception to the larger size of the specimens of *radiata*, and urge this as a reason for its not being of British origin; but size, in my opinion, is chiefly dependent upon the supply of food and selection, as all entomologists who breed large numbers of Lepidoptera are perfectly well aware. I have specimens of *lubricipeda* in my collection, and have seen others, which are to the full as large as any *radiata* that I have yet examined.

With regard to the occurrence of the var. *radiata* in Lincolnshire, several specimens appear to have been bred by Mr. Mossop from larvæ obtained at Saltfleet feeding on elder, August, 1836. These emerged in June, 1837, and some of the specimens are still in the possession of his nephew, Mr. W. H. B. Fletcher, of Worthing; others were sent by Mr. Mossop to Mr. James C. Dale, father of the Rev. C. W. Dale. Mr. Fletcher obligingly furnishes me with the following particulars:—"My knowledge of the occurrence of the varieties of *S. lubricipeda* is practically confined to that which is stated in my letter to Mr. Tugwell, in his article in the 'Entomologist' for April, 1894, except that there is a slight mistake: "Entom. xxvi. 257, var. *deschangi*," should read "Entom. xxv. 257, fig. 1." Now this fig. 1 comes very near to var. *eboraci* as figured Entom. xxvii. 205. My specimen is not exactly like either; it has the central spot and interrogation-like spots on the hind wings, but the fore wings have less of the *fasciata* marking than the *eboraci* figured Entom. xxvii. 205, and much less of the *radiata* markings of Entom. xxvi. 257. If then *eboraci* be a sufficiently defined variety to be worthy of a special name, and not, as I am inclined to think, merely intermediate between type and *radiata* (I know it only from fig. 1), I should refer my specimen to it, and say that *eboraci* occurs on the Lincolnshire coast. Next as to var. *fasciata*, I have none among my uncle's moths so boldly marked as that figured in Entom. xxvii. 205, but I have two specimens of Mr. Mossop's which are clearly tending to become *fasciata;* all the spots forming the 'Y' are present, but shorter, so that I think Lincolnshire may claim to possess var. *fasciata* also. I have never collected *lubricipeda* in Lincolnshire; my knowledge of it there is confined to the possession of seven specimens which came to me with the Rev. J. Mossop's cabinet, containing the remains of his collection and the information which his widow, my aunt, gave me, to the effect that these moths and others were reared by them from larvæ picked up on sandhills at Middlethorpe, which is close to Saltfleet, from where Mr. Mossop sent Mr. Dale three specimens (Entom. xxvii. p. 130)."

Respecting the reported occurrence of *radiata* on the east coast of England, Mr. John Cordeaux, of Great Cotes, Ulceby, Lincolnshire, referring to this form, says:—"Almost exclusively peculiar to Heligoland; met with but very rarely in Holland and on the east coast of England"; whilst Mr. T. D. A. Cockerell (Entom. xxii. p. 148) repeats this statement. Wishing to have this reported occurrence of *radiata* on the east coast of England cleared up, I wrote to Mr. Cordeaux, asking him to be good enough to furnish me with particulars of its occurrence; when, where, and by whom taken; and where the specimens might be at present located; in order that, if possible, I could have inspected them. Mr. Cordeaux, in reply, stated "that the notice published in the 'Naturalist,' 1888, was a verbatim translation from the original paper by Mons. le Baron de Selys Longchamps, Liège, Belgium. The exact words used are (p. 32):—'On la rencontre mais plus rarement en Hollande et sur la côte orientale d'Angleterre.'" Mr. Cordeaux also adds "that he is unable to speak from his own personal observation on the matter," but adds, "Probably the author of the 'Excursion à l'île d'Heligoland' refers to some English authority for his statement, but he gives no reference to this in the original. . . . The variety is undoubtedly an immigrant to Heligoland, so there is every probability of its occasional occurrence on the east coast." The following is a translation of the Baron's reply to my enquiries for definite information of the occurrence of the var. *radiata* on the east coast of England:—

"Liège, 7th October, 1894.—My dear Sir,—I write you from the country, although I always give my address at Liège, but I shall be in town in eight or ten days, and will then look over my collection and write you a few notes if I find anything that will be useful for you, with regard to the variety *radiata* of '*Arctia*' *lubricipeda*, but I am not sure that I possess any other positive information of my own observation except that which I have given in my 'Excursion to the Isle of Heligoland' in 1882. There I saw, at Mr. Gätke's, the ornithologist, numerous examples which had been reared from eggs. There were amongst them several varieties intermediate between *radiata* and the type. As to Holland, I am convinced that the observation of the country is positive, but I don't remember who was the Dutch entomologist who told me; it could be ascertained. As to the east coast of England, I don't remember where I obtained the information. In Belgium and Holland there have been found for some months melanic examples of *Amphidasys betularia*, but of a black less intense than in Scotland."

Messrs. Porritt and Tugwell have reared two broods (or at any rate a partial second brood) of *radiata* in one season, and this fact is thought by some entomologists evidence sufficient to warrant their refusing to believe in the genuineness of *radiata* as a British form. Personally I do not attach much importance to *radiata* being occasionally double-brooded, as it seems to me to be merely a question of forcing. I am not aware that two broods have been produced in one season under other than artificial conditions. So far as I know, there is no record of *lubricipeda* being double-brooded; and Mr. Jackson, of York, informs me that he has never, in his long experience of the species (extending over thirty years), known it to be so, even in a single instance, under natural conditions.

The Hull collectors, who also breed large numbers of *lubricipeda*, have never been fortunate enough to obtain *radiata*, neither have the collectors at Beverley, Bradford, Barnsley, Darlington, Durham, Hartlepool, Huddersfield, Keighley, Rotherham, Selby, Sheffield, &c.

With regard to the variation of *lubricipeda* in Durham, Mr. T. Maddison, of Durham city, writes:—"I have never got anything like a decent variety, nothing in the least approaching the York or Barnsley varieties"; whilst Mr. J. E. Robson, of Hartlepool, informs me "that although he has never bred *radiata* at Hartlepool, or known it to occur there, he has in his series of *lubricipeda*, bred from larvæ obtained at Hartlepool, several examples of var. *fasciata* and intermediate forms."

Mr. William Newman, of Darlington, has six exceptionally fine varieties of *lubricipeda* (three males and three females) in his collection, all reared from larvæ obtained at Darlington; one of the males being of the var. *fasciata* and two of the var. *eboraci;* whilst two of the females have the hind wings similar to the var. *radiata* and the fore wings almost typical. He has also bred other similar varieties from time to time.

I quite agree with Mr. Tugwell in thinking that the explanation of the occurrence of var. *radiata* in Lincolnshire and Yorkshire is to be attributed to the "brought over" theory, and that the original specimens or parents have come over to this country from Heligoland, either by their own unaided flight, or else as stowaways on board ship. The chances of their distribution inland would be materially increased by means of the railway. I have frequently known southern insects to be found in waggons arriving in York from the south.

(To be continued.)

ON *ZYGÆNA EXULANS* AND VAR. *SUBOCHRACEA*, WHITE.

By W. H. Tugwell.

In the 'Entomologist's Record' for November, 1894, is a long and interesting article by Mr. Tutt on *Zygæna exulans*, and certain very beautiful forms of this species that Dr. Chapman and himself had met with when on a tour over that entomological "El Dorado," the French, Swiss, and Italian Alps, during the last week of July and part of August. Mr. Tutt exhibited some of these very fine forms, and read notes on them, at the Entomological Society, and also at the South London Entomological and Natural History Society. One of the objects of the exhibition and remarks thereon appeared to be the upsetting of var. *subochracea*, Mr. Tutt considering that the "Braemar form, which Dr. White named var. *subochracea* (on his first discovering the insect in July, 1871, and cited in Entom. vi. 22), was only so named in consequence of their worn condition," and stated that the few specimens I had given him in 1886 "corresponded excellently with Dr. White's definition of what a Scotch *Z. exulans* (a somewhat diaphanous form) should be. They evidently belonged to the variety which Dr. White created specially for these rather rubbed specimens." But surely Mr. Tutt knows well enough that out of the long series Mr. L. Gibb and myself secured on our trip in 1886 many of them (50 per cent.) were in the finest order. That Mr. Tutt only had but moderately good ones was due doubtless to the fact that he *never gave me a specimen of any kind*, and we are naturally inclined to help those best who assist us. Still, one thing is evident: poor as they were, it has taken him six years to improve on them. But for Mr. Tutt to remark that it is only this year that we have learned how "really fine Scotch *exulans* ought to look," is simply ridiculous, as from 1886 to present time I have distributed to my friends over 1000 specimens, a large percentage being in the finest condition, and fully equal to any seen this year.

The curious part of Mr. Tutt's exhibit was that prior to showing them he had taken the extraordinary course of repinning and resetting some of his Scotch specimens, and then mixing them up with his continental examples in such a manner that no one but himself could have the remotest chance of using his own judgment as to their approaching each other, as Mr. Tutt simply refused to say which were continental and which were Scotch. He merely stated that "they were alike." Now one thing is self-evident: they either do or do not overlap each other in form. And may I be allowed to suggest to Mr. Tutt that it would have been much more satisfactory and conclusive if he had permitted others than himself to have seen the continental specimens arranged side by side with the Scotch; and then, as may be quite possible, others could have been convinced of the fact, and have seen for themselves that Dr. White's varietal name was superfluous. As it stands, no one can gainsay Mr. Tutt's statement, as they have no possible means of judging for themselves. Mr. Tutt very kindly brought his specimens to me, but, as he still followed the lines of his previous exhibit in London, I could only admire some of the most striking varieties. It was abundantly clear that many of them were so different that they looked as if they might belong to another species. Some of the specimens may have approached each other very closely, but his curious mystery of mixing and blankly refusing to point out the Scotch and continental individuals made it impossible for me to follow his statement. *This may be "science,"* but evidently I have not been educated up to this manner of it.

The box of specimens Mr. Tutt showed me contained possibly some forty or fifty specimens, and, referring to one row of a grand form, totally unlike any Scotch I had ever seen, I ventured to say that not one in that row was Scotch. Mr. Tutt said, "Yes, there is." "Which one?" I asked. He would not say. I then remarked that I knew every one that had ever been on the ground since 1872, and I should be glad if he would say who had parted with such a grand variety. Mr. Tutt warmly refused to say; and so the statement stands. As I could not get any very definite information from Mr. Tutt, I wrote to Dr. Chapman, telling him I was much interested in the Zygænidæ, and that Mr. Tutt had shown me some of their joint captures, but that he absolutely refused to indicate which were the continental specimens he stated to be like the Scotch. I asked Dr. Chapman to kindly judge, if I forwarded him a box of Braemar insects, if they were like some of his continental specimens, and telling him of the different views Tutt and I held; or would he kindly loan his continental forms to me? To this Dr. Chapman most kindly replied that he was "sorry to be unable to help me in *exulans*, as, although he had taken most of the specimens, he had passed them all over to Mr. Tutt. . . . . We met with *exulans* in several places; but in two excursions, when not accompanied by Mr. Tutt, I met with it abundantly at Lauteret, where it was magnificent, in size, colouring, and density of scaling, so that I did not take it to be *exulans;* here the vegetation was very luxuriant, the season having been propitious. On Valgrauson (Cogne) it was in thousands, but drought had prevailed, much vegetation was burnt up, and *exulans* had hardly any like the Lauteret specimens, and varied down to minute dwarfs, and others very colourless and transparent; the result, I took it, of starvation. The variation in the Grauson specimens was so great that I imagine *some* would be found like the Scotch, whilst I should be surprised if the typical specimens from each locality did not present considerable differences." Again Dr. Chapman writes:—"I agree substantially with your views as to varieties of *exulans*. I should be surprised if Braemar *exulans* did not differ from continental forms." These remarks of Dr. Chapman's are, to my mind, very conclusive as to the variation of our Scotch form from those he took, and should carry great weight.

From letters quoted above it is clear that, owing to the drought burning up the food at Valgrauson, many larvæ had starved, and consequently produced varieties, some of these coming near Scotch specimens; but Dr. Chapman says that the type there differs considerably; whilst the Scotch *subochracea* is not the result of accidental variety, but a constant form. Any way, each year from 1886 I have had specimens from Braemar, only missing one year, and they have always been of the same form. Only the smallest possible variation has been noticed; some few are almost colourless, and in others there is slight variation in size of spots or in colour, from bronzy blue to bronzy green, common to most of the Zygænidæ. To my mind the Scotch *exulans* is a very weak race, hence the want of pigmental colour; and I am certain that I should be enabled to pick out 98 per cent., if mixed with other forms, by characters that, so far as I have been able to judge, are constant and readily recognisable by any one well acquainted with the form.

Mr. Tutt mentions the specimens as shown by Mr. Percy Bright, so I wrote him for his opinion on them, as compared with Mr. Tutt's. He writes me:—"With regard to *exulans*, on comparing them with those that Mr. Tutt exhibited, I was struck with the fact that the continental specimens were much more strongly marked and denser in scales, giving them a handsomer appearance, than even the freshest of the Braemar specimens."

As to the question of synonymy, I am little disposed to enter; but, so far as I can see, the question is in a muddle. Neither Sigismond von Hochenwarth nor J. W. Dalman appears to be free from blunders; neither appears to have recognised the great difference between the sexes, making two species; both up to a certain extent make the female *Z. exulans*.

The short Latin description given by Hochenwarth is practically useless. He says:— "*Sphinx exulans.* Alis superioribus hyalino-virescentibus, albido nervosis, maculis quinque rubris utrinque conspicuis; inferioribus præter marginem apicis hyalino-virescentem, rubris immaculatis." This only serves for the female of our form, as the males never have white scales, or, as Hochenwarth afterwards, in his extended characters of his *exulans*, says, "feet whitish or yellowish." Our males have always black feet. And then Hochenwarth gives size as "equal to '*S. statices*' or '*S. filipendulæ*'"; certainly our Braemar insect never reaches the size of *filipendulæ*, but the continental does, and some of Mr. Tutt's specimens were even considerably larger than that. The largest *subochracea* I have ever seen, and only one, is $1\frac{7}{16}$ in., and the smallest is 1 in. only; an average male is $1\frac{1}{4}$ in.

Dalman's description is almost better, so far as our Scotch insect is concerned. Dalman says of *Z. exulans*:—"Alis anticis fusco-virescentibus subdiaphanis, subtus concoloribus, maculis quinque rubris inæqualibus (venis albidis), posticis rubris margine fusco-virescenti; antennis vix clavatis; pedibus luteis." This, too, only describes the female; but Mr. Tutt opines that our Scotch form is Dalman's *Z. vanadis*, which up to a certain point does agree with the Braemar male insect. Dalman's description of *vanadis* is, "Alis anticis fusco-virescentibus subdiaphanis maculis quinque rubris, basali exteriori elongata, posticis rubris margine fusco diaphano latiore; corpore pedibusque nigris pilosis; antennis brevibus clava crassa. Habitat in Lapponia." This is fairly well, but how does Dalman's further description agree? He says, "Maculæ quinque rubræ, *colore et ordine ut in* Z. loniceræ." Who ever saw a Scotch *exulans* of the colour of *lonicerœ?* I never did, and I may safely say I have seen more Braemar *exulans* than any other lepidopterist. It is just this great colour difference that renders Dr. White's name of *subochracea* not only characteristic, but necessary; and I believe that the Scotch form of *Z. exulans* will continue to be known by this name, notwithstanding Mr. Tutt's attempt to sink it in favour of *vanadis*. Dalman's *vanadis* is simply the male form, and in no way includes the female character; whilst Dr. White's *subochracea* covers both sexes (*vide* Entom. vi. 22-25).

Greenwich.

N.B.—The Latin descriptions of Hochenwarth and Dalman are copied from the 'Record,' as I have not the originals to refer to.—W. H. T.

CHARÆAS GRAMINIS IN DEVON.

By Major John N. Still, F.E.S.

Judging from the remarks made by Newman (Brit. Moths, 293), who quotes Linnæus on the damage done by the larvæ of this insect in Sweden, the account by the same author of the mischief done near Keswick, and the mention of another outbreak in Sweden as late as 1892, by Dr. Sharp (Entom. xxvii. 317), as well as the interesting article on the "hill grubs" of Southern Scotland by Mr. Service (*l. c.*, 278), we may consider *C. graminis* one of the more destructive of the Noctuæ.

Fortunately for the pastures of Devon, the insect is not as a rule abundant there. Until August, 1893, I had never met with it alive, and it was with considerable pleasure that I secured a series resting on thistle-heads.

The insect is supposed to fly only early in the morning and again in the evening, and Newman gives an interesting account of this habit, which I should never have dreamt of questioning but for my experience this year.

On August 30th, while walking over that portion of Dartmoor between Classenwell Pool and Princestown, a distance of four or five miles, *C. graminis* appeared in, I may safely say, thousands. They were continually on the wing, flying low over the grass and heather, and hardly a yard could be walked without putting one up; and they continued on the wing in the same numbers, flying in the hottest sunshine, from 11.30 till I left the moor about 4 o'clock. The next day, and a very hot one it was, the insects were again on the wing the whole distance between Princestown and Siwards Cross, and during a long détour back again, a round of nearly ten miles.

If the moths were flying in the same large numbers all over the moor as they were over that part I traversed—and I do not see why they should not have been, as there is not the slightest difference in the herbage—it would be almost impossible to exaggerate the prodigious quantities of this insect.

I can fully endorse the statements of Mr. Dalglish (Entom. xxvii. 317) as to the number of females; from my own experience they outnumbered the males by twenty to one. And also as to the enormous quantity of ova laid by the moths; from those captured I procured literally thousands of eggs.

The largeness of the proportion of females is interesting; they were evidently taking advantage of the great heat to deposit their ova. I am inclined to think that no males were on the wing, except those that our movements disturbed from their hiding-places amongst the heather.

In the case of *Neuronia popularis* and *Luperina cespitis*, the exception is to take a female by means of light; nearly all are males; perhaps the male *C. graminis* flies at the same time.

I shall be glad to hear the opinion of others.

Scottish Conservative Club, Edinburgh, Nov. 28th, 1894.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from vol. xxvii. p. 264.)

Cerigo matura, *Hufn.*—Widely spread, but rarely abundant. Some bright Irish specimens have very pale nervures on the outer marginal area like those of *Neuronia popularis*, and enclosing a series of wedge-shaped dark streaks along the hind margin. Very dark specimens, approaching the var. *texta*, Esp., sometimes occur, as at Magilligan, Co. Derry, Castletownsend, Co. Cork, and Markree, Co. Sligo, in which the fore wings are of a dark bistre brown, traversed by three pale waved lines, of which the basal and ante-marginal ones are sometimes almost obsolete, and the stigmata somewhat ferruginous, with pale outline. Hind wings broadly and darkly banded on outer margin. Localities: single specimens taken at Giant's Causeway (*C.*) and Armagh (*J.*); at Drumreaske, Monaghan, Castle Bellingham, Co. Louth (*Thornhill*), and near Sligo, it is not infrequent. I met with it in profusion at Castle Taylor, Co. Galway; and singly at Kenmare and Dursey I., Co. Kerry; and Howth.

Luperina testacea, *Hb.* — Usually common, especially on the coast. None of the various forms seem topomorphic, nor can I find any proof of local tendency to melanism. Both at Sligo on the west, and Howth on the east coast, very pale forms (var. *cinerea*, Tutt) occur, as well as specimens almost black. The latter Mr. Barrett also records from Belfast.

Luperina cespitis, *Fb.*—Of sparse occurrence, rarer inland than on the coast-line. Dublin coast (*B.*), Howth; Kilcool, Co. Wicklow; Athy, Co. Carlow; Minehead and Roche's Point, Co. Cork; Ardrahan (*Miss N.*), and Moycullen (*Miss R.*), Co. Galway; Hollybrook, L. Arrow, Co. Sligo.

[Mamestra abjecta, *Hb.*—Mr. Birchall's record of the capture of this species at Howth, and abundantly near Waterford, has never been confirmed.]

Mamestra sordida, *Bork.*—On the Dublin coast (*C. G. B.*).

Mamestra albicolon, *Hb.*—Mr. Birchall took this insect at Malahide and Howth, Co. Dublin; but repeated searches at these places of late years have proved unproductive. One at Magilligan, Co. Derry (*C.*); Castle Bellingham, not scarce.

Mamestra furva, *Hb.*—Not anywhere numerous. Howth and Wicklow coast (*B.*); rare near Sligo, and the specimens very large (*R.*); Castle Bellingham, Co. Louth (*Thornhill*); Carlingford (*J.*), Armagh; and Coolmore, Co. Donegal; a few near Derry (*C.*). Irish specimens for the most part seem very dark.

Mamestra brassicæ, *L.*—Extremely common. The insect varies in the intensity of the ground colour, occasionally being of a deep blackish brown; and at Howth and elsewhere on the sea-coast I have met with specimens of a smooth brown colour, with the pattern very well defined, with paler marbling. The var. *albidilinea*, Haw., occurs.

Mamestra persicariæ, *L.*—Rare in Ireland, and almost absent from the Northern counties. So far as my knowledge extends it does not vary appreciably, the subterminal row of dots being always present in the Irish specimens I have seen or taken. The most northern occurrence that I know of is a specimen taken by Mr. C. Langham, at Tempo Manor, near Enniskillen. Another is reported by Mr. G. Foster from Co. Down (Irish Nat., Jan. 1893); Sligo one (*M'C.*). It is not rare at Clonbrock, where Mr. Dillon found the larvæ on elder, or Castle Taylor (*Miss N.*), Moycullen (*Miss R.*), Co. Galway; Crossmolina, Co. Mayo; Kenmare and Killarney, Co. Kerry; near Cork (Sandford, Ent. xviii. 321) and Glandore (*D.*), Co. Cork; Portlaw, Co. Waterford (*Rev. W. F. Flemyng*); near Dublin (*Mr. Shield*).

Apamea basilinea, *Fb.*—Everywhere abundant. The most usual form, at least in the central part of Ireland, is of a pale brownish grey, unrelieved by any ferruginous tint or defined markings, except the pale stigmata and the basal streak; agreeing generally with Mr. Tutt's description of his var. *cinerascens*. Near Mullingar and elsewhere (Kenmare, Co. Kerry; Favour Royal, Co. Tyrone, &c.) occurs a much better delineated form, sometimes with ferruginous clouding on the central area of the fore wing, the orbicular and reniform stigmata clearly marked, especially the latter, which has its lower portion darkly suffused. A modification of this strongly marked form rarely occurs, having a dark shading from costa to inner margin, passing between the two stigmata. This appears to be var. *finitima*, Gn.

Apamea gemina, *Hb.*—Very common everywhere. Occasionally very dark specimens occur with the type, of a mottled greyish black. I have taken Mr. Tutt's var. *intermedia-rufa* in Tyrone, and the *intermedia-grisea* frequently in various localities. The var. *remissa*, Hüb., is not by any means uncommon at Howth, and near Kenmare, where splendid examples of it are to be met with. Also, but sparingly, at Drumreaske, Co. Monaghan; and Favour Royal, Co. Tyrone; Lambay I. near Dublin, and elsewhere.

Apamea unanimis, *Tr.*—Very rare in Ireland. Mr. Barrett took it near the Phœnix Park, Dublin; Killynon, Westmeath

(*Miss R.*); a series of eight, Castle Bellingham, Co. Louth (*Thornhill*).

Apamea ophiogramma, *Esp.*—Local, but widely distributed, I think, in Ireland. Drumcondra, on the canal banks, not infrequent (*S.*); Cromlyn, two (*Mrs. B.*); Killynon, one, Co. Westmeath; Johnstown, Co. Kilkenny (*S.*); Markree Castle, Co. Sligo; Clonbrock, Co. Galway; not rare at Castle Bellingham (*Mr. W. B. Thornhill and myself*), Co. Louth; Belfast marshes, one (*W.*).

Apamea leucostigma, *Hb.*—Widely distributed and locally abundant in Ireland. The type is often of a very dark sooty black, occasionally with the stigmata almost wholly obliterated, sometimes the reniform ochreous, but generally white. The ground colour varies gradually to a bright ruddy brown, and the markings and bands similarly increase in distinctness until we reach the brightest form of the var. *fibrosa*, Hüb. I have taken both extremes constantly at the same localities, and can find no indication of any topomorphism in this species. Belfast (*B. and W*)., Derry (*C.*), Markree Castle and elsewhere, near Sligo, abundant; Killynon (*Miss R.*), Coolmore (*I.*), Stranorlar, Ards, and near Donegal; Favour Royal, Tyrone; Armagh (*J.*); Drumreaske, Co. Monaghan; Farnham, Co. Cavan; Clonbrock, abundant, and Galway (*A.*); Castle Bellingham (*Thornhill*), Co. Louth; Ballycotton (*S.*), Co. Cork; Killarney, abundant (*B.*), &c.

Apamea didyma, *Esp.*—Very common in most localities. The following aberrations are among those I have taken.

A dirty-grey unicolorous form, Howth, Co. Dublin; and Toberdaly, King's Co.

The same, with a whitish stigma; ab. *grisea-alba*, Tutt.

One similar, with the addition of an ⊢⊣ mark, taken at Clogher Head, Co. Louth.

Ab. *secalina*, Hb.—Same locality, and elsewhere, rare.

Ab. *I-niger*, Haw.—Pretty common.

Ab. *rara*, Haw.—Not common. On the south coast, and at Clogher Head, Co. Louth; Loughrea, Co. Galway.

Ab. *furca*, Haw.—Common in most localities.

Ab. *lugens*, Haw.—Rare.

Ab. *leucostigma*, Esp.—A common form.

Unicolorous forms are numerous, ranging from dingy grey, reddish, dark brown, to black ab. *lugens*.

(To be continued.)

NOTES AND OBSERVATIONS.

Monochammus sutor, L., in Yorkshire.—A male specimen of this beetle, which had been caught in the workshop of one of the timber-merchants of Leeds, was given to me on Aug. 14th this year. It was kept alive for over a month by feeding it on small cubes of cabbage, cut from the midrib of the leaf, which enabled me to measure approximately its rate of feeding. I kept it under a large bell-glass, up the sides of which it could travel with ease, falling only when it got too far on the rounded dome of its prison. By some accident the right anterior tarsus was injured, and the power of climbing glass was denied it, and one witnessed, when it was not asleep or feeding, a constant but unsuccessful attempt on its part to climb the bell-glass by substituting the middle foot for the injured fore foot. It fed well, especially towards midnight, and died apparently because, as a male, its period of life as a perfect insect was short. When feeding, the long antennæ were always curved, and the tips—nearly four inches apart—were in constant motion, though the cube of cabbage on which it fed was more than an inch away from them. When walking on my hand it sometimes paused to bite it. Its feet were well adapted for climbing, being furnished with concave pads of curved hairs, those on the anterior pair of tarsi being one-third larger than those on the middle and posterior pairs. The weight of the insect, the shifting of its equilibrium, and the inability to apply the pads of the right mid foot effectively, were probably the causes why the *Monochammus* could not ascend a glassy surface after it was injured. On examining the tarsi, without attempting to dissect them, as the insect was sufficiently valuable to preserve entire, I made out several points of interest. The claws on the last joint (onychium) were long, sharply pointed, strongly curved, and almost at right angles to the joint; the third joint was deeply bilobed, its distal portions somewhat enwrapped and supported the onychium. The first, second, and third joints were provided with pads of curved hairs; all the joints had on their dorsal aspects strong straight hairs, and on their margins long simple hairs, which curved downwards and curled in towards the pads so conspicuously as to give the tarsi a feathery appearance. The hairs which formed the pads were curved backwards, their tips being flattened and terminated by acuminate ovate areas. On these areas, and projecting from the *outer* or *dorsal* aspect of each hair, were patches of six to eleven short conical spines, inserted at right angles to the hair which carried them. Supposing each pad to have been made up of 1000 curved hairs,—and probably there were many more,—and that each of these carried an average of eight conical spines, there must have been over 140,000 spines on the feet of the beetle I was examining. Small need to wonder at the ease with which it went up a wall of glass. As only about half-a-dozen records of the occurrence of this beetle are known in Britain, and, so far as I can learn, none for Yorkshire, this record and note may be of some interest to coleopterists.—Henry Crowther, F.R.M.S.; The Museum, Leeds, Nov. 19th, 1894.

Note on Bombyx trifolii.—As the food-plants of this species are being discussed, I may mention that I have found the larvæ thrive admirably on *Plantago major*. With regard to Mr. Turner's note (Entom. xxvii. 316) concerning the disastrous effect of removing the pupæ from their cocoons, it is noteworthy that in some conditions it seems equally fatal to their emergence to leave them alone. A few years ago I reared some larvæ of this species till they spun up, but many weeks elapsed, no moths having emerged, It was found, on examination, that in every case the insects had matured, and had left the pupal case as far as they were able, but had been unable to push their way through the partially-ruptured cocoon. In some instances the palpi and head of the dead and dried prisoner could be seen protruded. From the condition of the cocoons it appeared that there had been a lack of sufficient solvent fluid to enable enough of the front part to be softened to admit the passage of the moth. I have never found this inability to escape from their cocoons with *Bombyx quercus*, although it is a very laborious process with this species, as may be observed if it is witnessed from the commencement. After the front end of the cocoon has been sufficiently softened, the moth begins a series of strenuous efforts to escape, which are never wholly successful at once, prolonged rests being taken by the insect between its endeavours to force an exit.—R. M. Prideaux; Carisbrooke, Isle of Wight, Nov. 19th.

Caradrina superstes not a British Insect.—It now appears that *Caradrina superstes* has not yet been taken either in Guernsey or England; the specimens I have taken in the past few years, and of which I, in conjunction with Messrs. Abbott and Tait, took over two dozen this past autumn at Freshwater, turn out to be *C. ambigua*. Mr. L. B. Prout discovered the blunder, and pointed it out to Mr. Tutt as far back, if my memory serves, as October, at a meeting of the City of London Entom. and Nat. Hist. Society. Mr. Tutt then acknowledged his mistake, but has not seen fit to correct it yet, beyond a sudden alteration of the name, without explanation, in the subsequent numbers of the Ent. Rec. I have taken the liberty of drawing your attention to the fact, in view of your article (Entom. xxvii. 342) on "Additions to the List of British Lepidoptera during the past ten years."—Albert Hodges; 2, Highbury Place, N., Dec. 20th, 1894.

On the Lanceolate Form of Epinephele hyperanthes.—In July, 1893, I captured, at Oxford, a remarkable variety of *E. hyperanthes*, Linn. (*tus*, Stgr. Cat.), which is identical with Mr. South's figure (Entom. xxvi. 281). I propose to name this form *lanceolata*. The other extreme form, in which the ocelli or spots on the wings are almost obsolete, is called *arete*,* Müller, by continental entomologists.

Var. *lanceolata*.—Colour similar to the type. Upper surface: fore wings with two largish roundish ocellated spots, with a creamy-white centre spot; the blackish ring is rather thick, and is margined with a rather wide creamy-white margin; hind wings with four similar ocellated lanceolate spots, each having a whitish centre; the spots are much narrower on the outer side nearer the margin of the wings, and are in one or two instances produced to a point; the spot at the apical angle of the hind wings is considerably smaller than the others.

---

* *Arete*, Müller, Fn. Fr. p. 36; Ochs. Die Schm. Eur. i. 1807, p. 228.

Under side: fore wings with two large semi-lanceolate ocellated spots, the one nearest to the costa being much larger than the other; hind wings with five lanceolate ocellated spots, the two spots near the upper margin being confluent, with whitish centres and a large creamy margin; the other three spots are almost of equal size, the centre one being slightly larger than the others.

Accounts of this form, to recapitulate which is unnecessary, will be found in the 'Entomologist,' vols. xxv: p. 215; xxvi. p. 281; and in Mr. Barrett's Brit. Lep. vol. i. p. 253.—John W. Shipp; Oxford, 1894.

CAPTURES AND FIELD REPORTS.

Amphidasys betularia var. doubledayaria in Ireland.—It may interest some of your readers to know that from pupæ dug by myself in this locality last winter, *A. betularia* var. *doubledayaria* emerged on June 26th. This is, I believe, the first recorded capture in Ireland. As I possessed no pupæ obtained from any other source at that time, there is no possibility of any mistake.—W. B. Thornhill; Castle Cosey, Castle Bellingham, Ireland, Dec. 9th, 1894.

Plusia moneta in Berks.—During the last week of June, 1894, I captured two specimens of *Plusia moneta* in the garden here, flying at larkspur (*Delphinium*) on successive evenings. I see there is another specimen, I believe recently captured, in the Holland Collection at Reading Museum. I want a record of this moth for Dorsetshire.—M. J. Mansfield; Hurstcroft, Ascot.

Rare Lepidoptera at Freshwater.—I am able to record the capture of five specimens of *Caradrina ambigua* and one specimen of *Leucania albipuncta*, at sugar, between Sept. 15th and 21st, at Freshwater, Isle of Wight, all in fine condition.—P. W. Abbott; Four Oaks, near Birmingham.

Lepidoptera at Light at Ipswich.—Although the year 1894 has been generally adverse to day-collecting and net-work, I have not found a consequent decrease in the number of Heterocera, having devoted more time to the two electric arc-lamps in this town and the ordinary gas-lamps, although the early morning visits to these sources in April and May were not nearly so productive of insects as 1893, the only captures worth recording being *Tæniocampa populeti* and *Dicranura bifida* on April 9th; but this I attributed to the weather. As an instance of the diminished numbers, last year, when the gas-lamps would be dotted with "brimstones," their colour showing off to advantage in the rays of the rising sun, and perhaps by the proximity of an example of *Euchelia jacobææ*, I have not seen more than a half-dozen of the former this year, while of the latter not one has turned up. All loss in this way, however, was made up by spending an occasional evening at the electric lamps till the early hours of the morning, the lost repose being amply repaid by the happy time spent in continually wielding the net at occasional representatives from the "hawk-moths" or other larger species. In point of abundance, the first place must be assigned to *Melanippe fluctuata* and *Noctua c-nigrum*, both of which were a perfect nuisance; the former was on the wing right away from April to September, while on some occasions fifty of the latter might easily have been taken at rest in the vicinity of the arc-lamps during the day, and the last specimen seen was on October 31st. *Amphidasys betularia, Arctia menthastri, A. lubricipeda, Hadena chenopodii, Xylophasia polyodon, Mamestra brassicæ, M. persicariæ, Agrotis exclamationis, Phlogophora meticulosa, Luperina testacea*, and *Plusia gamma* were also numerous in their season. Some remarkable melanic specimens of *A. betularia* occurred, a few having wings perfectly black, except for a slight resemblance to the usual colour on the hind wings just where the hind margin of the fore wing overlaps. Those showing this aberration were usually much smaller than the normal insect. Following is a list of captures for each month, commencing with March; where not otherwise stated, they were taken at electric light. March, on lamps: *Aniosopteryx æscularia, Hybernia progemmaria, T. munda, T. gothica.* April: *Amphidasys prodromaria, Biston hirtaria, T. instabilis, T. stabilis, A. æscularia* (23rd); lamps—*T. populeti, Selenia illunaria, Lobophora lobulata, Cidaria miata.* May: *Notodonta chaonia;* lamps—*Eupithecia vulgata, E. absinthiata.* June: *Hemerophila abruptaria, Grammesia trilinea, Smerinthus ocellatus, S. populi, Sphinx ligustri, Pygæra bucephala, Hadena pisi, Dicranura bifida, Ptilodontis palpina, Eurymene dolobraria, Plusia chrysitis, Caradrina alsines, Axylia putris, Miana strigilis, Acronycta tridens* (?), *A. psi, Agrotis segetum, Euplexia lucipara, Boarmia rhomboidaria, Eupithecia rectangulata*; lamps—*Metrocampa margaritaria.* In July I was away on my holiday, and only took *Chelonia caia, Plusia iota, Bombyx neustria, Amphidasys betularia* (27th), and *Acidalia imitaria.* August: *Leucania lithargyria, Agrotis puta, A. tritici, Noctua rubi, Notodonta camelina, Triphæna orbona, T. ianthina.* September: *Noctua plecta, Heliophobus popularis, Ennomos tiliaria, E. fuscantaria, A. exclamationis* (18th), *Hydræcia micacea*; lamps—*Catocala nupta, Eubolia cervinaria.* October: *Melanippe birivata, Agrotis suffusa, Anchocelis pistacina, A. litura, Xanthia ferruginea, Nonagria lutosa*; lamps—*E. cervinaria* (3), *Chesias spartiata* (3), *Polia flavicincta, Oporabia dilutata, Hybernia defoliaria.* On the 8th, early morning, I took *Nonagria typhæ* (2), *Gortyna flavago* (1), *Xanthia gilvago* (1), *Eugonia tiliaria* (3), *E. angularia* (1), *Cidaria testata* (1), *C. miata* (2), *Mamestra brassicæ*, and *Rumia cratægata*, which speaks for the mildness of the weather at this time, and this has been still further exemplified by the following captures in November:—*Diloba cæruleocephala, Chesias spartiata* and *P. gamma*, on the 5th; other captures up to the time of writing being *Himera pennaria, Cheimatobia brumata, H. defoliaria*, and *H. aurantiaria.*—Claude A. Pyett; 28, Waterloo Road, Ipswich.

Liparis salicis in the London District. — With reference to Mr. Bird's communication (Entom. xxvii. 347) concerning *Liparis salicis*, I may say that I found the moth on a fence here in August last year. Bromley is ten miles distant from London Bridge. — E. H. Tait; 4, Holwood Road, Bromley, Kent, Dec. 15th, 1894.

In 1886 I found larvæ of this species common at West Dulwich, and bred the perfect insect therefrom. This year (1894) I saw several larvæ on the same trees.—Walter A. Pearce; 88, Croxted Road, West Dulwich, S.E.

Aporia cratægi in Monmouthshire, 1893.—I have much pleasure in stating that this fine species still exists—or at least existed last year—in Monmouthshire. It has just come to my knowledge that on May 22nd, 1893, Messrs. H. S and C. N. Johns, of this town, while collecting on the moors a few miles from here, came upon three webs, two of which were of considerable size, upon whitethorn bushes, and an examination resulted in the discovery of several larvæ of *Aporia cratægi*, nearly full grown, but still feeding. Some of these were taken, but unfortunately all died, not one of them pupating. A short distance further on, four newly-emerged imagines of the same species were captured while flying in some clover fields; and one of the specimens is now in my possession, having been kindly presented to me by Messrs. Johns, who still have the three others. The date is undoubtedly early for imagines of *cratægi*, but that is easily accounted for by the very exceptional weather of 1893. The captors were well aware that this insect was formerly abundant in the county, but did not know that it had become scarce of late years; consequently their discovery was treated as a matter of course, and they have not since been to the place. As the insect is such an old inhabitant of Monmouthshire, I have no doubt that it could have been taken during the last season by anyone who had chanced to visit the spot; and I hope to be able to give a further account of it next year.—W. Edney Cox; 25, Caeran Road, Newport, Mon., Dec. 10th, 1894.

Captures at Sugar during 1894.—Having read the reports of collectors from various parts of the country, I noticed with surprise the desponding way in which the majority spoke of their evenings with the sugaring tin. I append a list of insects which I either saw or took on sugar during this season, and although it may contain no "rarities," yet proves that sugaring was not altogether unproductive in this district:—*Boarmia repandata*, *B. rhomboidaria*, *Iodis lactearia*, *Acidalia remutata*, *Timandra amataria*, *Cabera pusaria*, *Hybernia progemmaria*, *Larentia didymata*, *Melanippe sociata*, *M. fluctuata*, *Phibalapteryx lignata*, *Cidaria testata*, *Thyatira batis*, *Cymatophora or*, *Asphalia diluta*, *Acronycta psi*, *A. rumicis*, *Leucania lithargyria*, *T. pallens*, *Hydrœcia nictitans*, *H. micacea*, *Xylophasia rurea*, *X. lithoxylea*, *X. sublustris*, *X. monoglypha*, *Dipterygia scabriuscula*, *Neuria reticulata*, *Mamestra brassicæ*, *Apamea basilinea*, *A. gemina*, *A. unanimis*, *A. leucostigma*, *A. oculea*, *Miana strigilis*, *Grammesia trigrammica*, *Caradrina morpheus*, *C. alsines*, *Russina tenebrosa*, *Agrotis puta*, *A. suffusa*, *A. segetum*, *A. exclamationis*, *A. nigricans*, *A. tritici*, *A. aquilina*, *Noctua glareosa*, *N. augur*, *N. c-nigrum*, *N. triangulum*, *N. brunnea*, *N. festiva*, *N. dahlii*, *N. rubi*, *N. umbrosa*, *N. baia*, *N. xanthographa*, *Triphæna comes*, *T. pronuba*, *Amphipyra pyramidea*, *A. tragopogonis*, *Mania maura*, *M. typica*, *Tæniocampa gothica*, *T. incerta*, *T. stabilis*, *T. pulverulenta*, *Orthosia lota*, *Anchocelis rufina*, *A. pistacina*, *A. lunosa*, *A. litura*, *Cerastis vaccinii*, *C. spadicea*, *Scopelosoma satellitia*, *Xanthia fulvago*, *X. flavago*, *X. circellaris*, *Calymnia trapezina*, *Polia flavicincta*, *Cleoceris viminalis*, *Miselia oxyacanthæ*, *Agriopis aprilina*, *Euplexia lucipara*, *Phlogophora meticulosa*, *Aplecta nebulosa*, *A. advena*, *Hadena protea*, *H. dentina*, *H. adusta*, *H. pisi*, *H. thalassina*, *H.* (*trifolii*) *chenopodii*, *Gonoptera libatrix*, *Plusia gamma*, *Catocala nupta*. Some Coleoptera which turned up included *Carabus catenulatus* (15), *C. violaceus*, *C. granulatus* (8), *Hypulus proteus*, *Dorcus parallelopepidus* (2), and *Endomycus coccineus*.—Ernest Baylis; Burrell Road, Ipswich.

Collecting in Argyleshire from June 10th, 1894.—The following is a complete list of species taken or observed here, omitting the month of August, when I was away. Sugaring was very successful during the latter part of June and beginning of July. Even on very windy nights moths swarmed on the trees. Since that time it has been absolutely useless. Rhopalocera:—*Pieris brassicæ, P. rapæ, P. napi, Argynnis euphrosyne, A. selene, A. aglaia, Hipparchia ianira, H. semele, H. hyperanthus, Cœnonympha pamphilus, Vanessa urticæ, Lycæna alexis, Polyommatus phlœas.* Heterocera:—*Smerinthus populi, Hepialus velleda, H. humuli, Lithosia quadra, Euchelia jacobææ, Euthemonia russula, Chelonia plantaginis, Arctia caia, A. fuliginosa, A. menthastri, Orgyia antiqua, Bombyx rubi, Rumia cratægata, Metrocampa margaritaria, Odontopera bidentata, Himera pennaria, Cleora lichenaria, Cabera pusaria, Lomaspilis marginata* (abundant), *Larentia pectinitaria, Emmelesia affinitata, E. alchemillata, E. albulata, Coremia munitata, Thera juniperata, Hypsipetes ruberata, H. elutata, Melanthia ocellata, Melanippe hastata, M. rivata, M. montanata, M. subtristata, Camptogramma bilineata, Phibalapteryx lapidata, Cidaria psittacata, C. russata, Anaitas plagiata, Tanagra chærophyllata, Thyatira batis, Acronycta ligustri, A. rumicis, Leucania comma, L. pallens, Hydræcia nictitans, Xylophasia rurea, X. lithoxylea, X. polyodon* (also black variety), *Neuria saponariæ, Charæas graminis, Apamea basilinea, A. gemina, A. oculea, Miana fasciuncula, M. furuncula, Caradrina cubicularis, Rusina tenebrosa, Agrotis corticea, A. porphyrea, Triphæna fimbria, T. orbona, T. pronuba, Noctua glareosa, N. augur, N. plecta, N. c-nigrum, N. triangulum, N. brunnea, N. festiva, N. xanthographa, Orthosia lota* (reared from larvæ taken on sallow), *Xanthia fulvago, Cosmia trapezina* (reared), *Polia chi, Epunda viminalis* (reared), *Phlogophora meticulosa, Hadena dentina, H. oleracea, Calocampa exoleta, Cucullia umbratica, Plusia iota, P. pulchrina, P. gamma, Euclidia mi.* Larvæ of *Saturnia carpini* have been plentiful. Amongst other larvæ taken are *Dicranura vinula, Pygæra bucephala, Clostera reclusa, Notodonta camellina, N. ziczac, N. dictæoides, Smerinthus populi, Bombyx quercus* (*callunæ*), *Cymatophora flavicornis, Acronycta psi, Bombyx rubi* (very abundant on the heather). Do these caterpillars feed again in the spring? Now their favourite food appears to be sallow, which is not in leaf much before May. I could find no larvæ in the spring. When I have tried to rear them before, they have invariably died at the end of the winter.—(Miss) M. L. Cottingham; Kilberry, Argyleshire, October 29th.

NOTES FROM FOREIGN PERIODICALS.

Nickel Entomological Pins.—In order to obviate the disadvantages attending the use of ordinary pins, the firm of Emile Deyrolle, of Paris, have carried out a large number of experiments during the last two years, the object being to produce a pin which should be as nearly perfect as possible. Nickel seemed to promise the best results, but the pure metal was found to be too hard and brittle to be drawn into wire. Recourse was therefore had to an alloy, the composition of which is not divulged, containing a preponderance of nickel. This mixture, according to the author, has yielded the most satisfactory results. The price of the new nickel pins is very little above that of those generally in use. The same firm have also introduced balls of naphthaline, which are cast round a pin in such a way that they can be fastened in any part of the drawer without fear of their becoming loose.—(*Le Naturaliste*, No. 183, 233).

Asymmetry in Coleoptera.—At the Congress of Caen (the French Association for the Advancement of Science) a paper on the above subject was read by M. Albert Fauvel. Out of the vast number of species comprised in this Order, the author finds only eight cases of specific asymmetry, shown in three species of *Osorius* from Madagascar; a species of *Oxytelus* found in India, Madagascar, and the Cape; two species of *Platydema*, one from Ceylon, the other from the Island of Damar (Zimor); a *Diamerus* from Guinea and Senegal; and a *Doubledya* from Japan. A case of generic asymmetry is shown by the genus *Phytolinus* from Japan. Lastly, a case of tribal asymmetry in the four genera, *Amblystomus*, *Badister*, *Orescius*, and *Licinus*, forming the tribe of the Licini, a branch of the Carabidæ (*l. c.* 234).

Belgian and British Lepidoptera.—It is interesting to note that in a list of Lepidoptera collected by M. de Cromburghe in Belgium during the past season, out of a total of twenty-four species considered noteworthy, eighteen and one variety are also found in Britain, viz.: *Lithosia muscerda*, *Cilix glaucata*, *Stauropus fagi*, *Cymatophora fluctuosa*, *Agrotis tritici*, *Charæas graminis*, *Neuronia popularis*, *Hydræcia nictitans*, *H. micacea*, *Xanthia fulvago* and var. *flavescens*, *Cucullia absinthii*, *Plusia moneta*, *Eugonia alniaria*, *Hadena protea*, *Tapinostola fulva*, *Hoporina croceago*, *Cidaria berberata*, *Eupithecia linariata*.—(*Annales de la Société Entomologique de Belgique*, 1894, x. 504).

Polygamy in Moths.—Polygamy in two species of North American Heterocera has been observed, viz., *Callosamia promethea* and *Anisota stigma*. In the former case a female mated with four different males, and another specimen with four different males the first day of emergence, and the following day attracted an even larger number. In the case of *Anisota stigma*, a male copulated with the same female on two successive nights, and with another female the next day.—(*Psyche*, vol. vii. No. 222, p. 155). The subject is also referred to in No. 223 of the same Journal. W. M.

RECENT LITERATURE.

M. Wytsman's Reissue of Hübner's Works on Exotic Lepidoptera.

We have already more than once called attention to this praiseworthy undertaking, which places in the hands of lepidopterists two works which have become so rare and costly as hardly to be accessible at all, except to those who are within the reach of large metropolitan libraries. All certainty in the determination of Lepidoptera rests on the correct interpretation of the older authors; and many of the illustrated books of the last century and the beginning of the present, are not only pre-eminently valuable on this account, but also for the excellence of the illustrations themselves. Nevertheless, illustrated works are not only very expensive to produce, but are generally issued in very limited numbers; and, as time passes on, they become scarcer and scarcer, for they ultimately become absorbed into public libraries and cease to pass from one owner to another. We could mention several important entomological works of which we believe there are probably not more than a hundred, twenty-five, or, in one case, possibly barely half-a-dozen complete copies in existence. But besides this, the number of public libraries keeps on increasing, and so likewise the number of entomologists who require such books; and therefore the available supply actually diminishes in proportion to the demand.

Without being quite so rare as the books to which we have alluded, Hübner's works are now very scarce, and frequently fetch an extravagant price if an occasional copy turns up; and M. Wytsman has done a real service to entomologists by offering them a reissue of Hübner's two great works on Exotic Lepidoptera: the 'Sammlung exotischer Schmetterlinge,' and the 'Zuträge zur Sammlung exotischer Schmetterlinge.'

The former of these consists of three quarto volumes of plates, each plate illustrating a single species, and consisting generally of two or four figures. Of these there are 439, the greater part representing butterflies. The first two volumes were issued between 1806 and 1824, and have a complicated nomenclature; a trinomial nomenclature being used in the first volume, and a binomial nomenclature in the second. Each volume has a title-page and index, but no other text except a few odd pages, each giving a full account of a single species, on one side the page in Latin, and on the other in German. The commencement of a third volume was issued by Geyer after Hübner's death; there is no title-page nor index to these plates, but a binomial nomenclature is used, and the plates are distinguished from the others by having the localites added at the foot.

Hübner's 'Zuträge' illustrates smaller Lepidoptera, chiefly moths; and gives an upper and under side of each species, several species being represented on the same plate. It consists of five decades, each containing figures of 100 species, or 1000 figures of 500 species in all, and was published between 1818 and 1832, the later decades being by Geyer. The letterpress is in German, but rather meagre; and the indices are good. This is one of the very few works of Hübner's to which he published the complete letterpress.

These are the valuable works which M. Wytsman is now reissuing, at a comparatively low price; and as the edition even of this reissue is necessarily limited by the probable demand, we should advise all those who require a good series of illustrations of Exotic Lepidoptera to secure it while it is still obtainable.

The seven parts which have now been published include the first seventy plates of the 'Sammlung,' illustrating seventy species of various groups of Nymphalidæ and Lemoniidæ (mostly American, though some are Indian, and a few African), many of which were illustrated in this work for the first time.

The original indices and letterpress will be reprinted at the close of the work, and Mr. Kirby has undertaken to prepare additional indices giving the modern nomenclature of the species, and to add such notes on the various species figured as may appear to be necessary or desirable. These will be printed in German, to render them uniform with the letterpress of the original works.

FRANCIS BUCHANAN WHITE.

Born, March 20th, 1842.

Died, December 4th, 1894.

AN ACCOMPLISHED STUDENT OF NATURE, AND A MASTER OF MANY OF HER SECRETS.

From a photograph by Magnus Jackson, Perth.

Yours truly
F. Buchanan White

THE ENTOMOLOGIST

Vol. XXVIII.] FEBRUARY, 1895. [No. 381.

DR. F. B. WHITE.

Francis Buchanan White was the eldest son of Dr. Francis Isaiah White, for many years one of the leading medical practitioners in the city and county of Perth. He was educated at the Perth Academy until he entered the Edinburgh University. After passing, with distinction, through the regular medical curriculum at Aberdeen College, he returned to his native city; but instead of following the profession for which he had qualified, he devoted himself to the study of Natural History, in several branches of which he has done excellent work. In 1867 he delivered the inaugural address before the Perthshire Society of Natural Science, of which he was the founder and the first President. In 1871 publication of the 'Scottish Naturalist,' and the 'Proceedings' of the Society just mentioned, were respectively commenced under his editorship. He was elected a Fellow of the Entomological Society of London in 1868, and of the Linnean Society in 1873. Dr. White was the discoverer in Scotland of several insects new to the British lists, among which were *Zygæna exulans*, *Ablabia* (*Aphelia*) *argentana*, and *Zelleria saxifragæ*. Of the last named he also found larvæ on *Saxifraga aizoides* and *S. oppositifolia*.

Among the more important of his entomological writings are the following:—

Lepidoptera of Perthshire, being Part I. of 'Fauna Perthensis.'

Notes on the Insects of Strathglass, Inverness-shire. E. M. M. vii.

On Involuntary Migration in Insects. E. M. M. viii.

Notes on *Corixa*. E. M. M. x.

The British Species of *Crambus*. Scott. Nat. 1872.

On Melanochroism and Leucochroism. E. M. M. xiii., xiv.; and Entom. x.

List of the Hemiptera of New Zealand. E. M. M. xiv., xv.

New and Rare Hemiptera observed during the years 1874, 1875, and 1876, in Britain. Entom. x.

Note on certain Parasitic Fungi which attack Insects. Entom. xi.

On the Male Genital Armature in the European Rhopalocera, 3 plates. Trans. Linn. Soc., 2nd ser. Zool., vol. i.

Collecting in Glen Tilt. Entom. xi.

Note on the genus *Orthezia*. Entom. xiii.

Some Thoughts on the Distribution of the British Butterflies. Entom. xiv.

Structure of the Terminal Abdominal Segments in the Males of the genus *Eupithecia*, 2 plates. Entom. xxiv.

The present high position of the Perthshire Society of Natural Science is largely due to the energetic interest which Dr. White always took in it. At the meeting of this Society in December last, the President, referring to the great loss which they had sustained in the death of the founder and prime supporter of the institution, said :—

"I shall not attempt to lay before you to-night any detailed biographical notice of the late Dr. Buchanan White, but shall content myself with recalling to your minds, in a few words, what we owed to him as a fellow-worker in the field of scientific research and in the management of the affairs of this Society. Those of us who have had the privilege of accompanying him in Natural History rambles throughout the county know well what an accurate observer and what a genial companion he was. Nothing seemed to escape his notice, either in organic or inorganic nature. He was a specialist of the highest rank in certain branches of Natural Science, and yet he never allowed his specialism to interfere with his appreciation of Nature as a whole. Not only had he the keen eye of the trained naturalist to detect the minutest distinction in plant or insect, but he had also to a large extent the eye of the artist and the feeling of the poet to admire and reverence all that is beautiful in form or colour in Nature. This combination of faculties is the more noteworthy, as it is only too rare amongst the naturalists of the present day. As a companion in the field, none could have been more willing to contribute of his store of knowledge than he was, and yet never for a moment did we feel that the information was being forced upon us, or that there was even a trace of ostentatious display of superior attainments. Truly the humility which comes of true greatness was his. He was endowed with a large sense of humour, which made his companionship particularly charming. Every now and then, in the midst of serious work, some trivial circumstance would strike him in a ludicrous aspect, and his merry laugh could not but infect those round about him. Regarding his scientific work I shall not go into any details here, but in order to show the versatility of his genius I shall merely remind you that besides being one of the leading authorities in the country on the Lepidoptera and Coleoptera, and on the willows and certain other groups of plants, he had also worked up most thoroughly the flora of Perthshire, the land and freshwater Mollusca of Scotland, and the Fungi of large districts in Scotland. He had also studied carefully some of the difficult groups of microscopic insects, and was well acquainted with the moss and lichen flora of the country. In later years he turned a good deal of attention to geology, more especially in its relation to the distribution of plants and animals, and had a good knowledge of the geological structure of the country around Perth. I ought not to omit to mention also the work he did amongst the mammals, birds, and other vertebrates of Perthshire and the basin of the Tay. I will not presume to enlarge on the work which he did in connection with the Perthshire Natural History Museum. That museum itself is a monument which will tell to future generations the story of years of anxious thought, of patient labour, of loving care for all the things by which God made this world beautiful. Of the wisdom and forethought with which he guided the affairs of the Society all who have served on the Council know full well. Sometimes we were inclined to think that he held out too rigidly for carrying it on strictly on the lines followed by the metropolitan societies, but experience has shown that in this he acted wisely, and the benefit has been reaped in the reputation which our Society, especially in regard to its publications and its museum, has attained. At the same time it must be remembered that while he held strong opinions of his own, and was ready to express them strongly too if needful, yet he was ever ready to listen to the views of others, and to extend a broad-minded liberality towards those who differed from him."

Apart from matters pertaining to his favourite studies Dr. White did not enter much into what is known as public life, but he was seldom absent from important social gatherings. His genial manner and amiable disposition endeared him to all with whom he came in contact, and he will be greatly missed, not only in his own city and among his own people, but by that wider circle who knew him only as a correspondent or through his published writings.

SPILOSOMA LUBRICIPEDA AND ITS VARIETIES IN YORKSHIRE, DURHAM, LINCOLNSHIRE, &c.

By W. Hewett.

(Concluded from p. 8.)

Var. *eboraci.*—This, in my opinion, is by far the most interesting variety of *S. lubricipeda*, and occurs more abundantly in the neighbourhood of York than elsewhere, though it is by no means confined to the environs of our fine old city, or indeed to the county, as it occurs to my knowledge at Driffield, Darlington, and Hull; also in Lincolnshire. See Mr. Fletcher's remarks already quoted.

Mr. Carrington's statement (Entom. xxiii. 207) that *S. lubricipeda* var. *radiata* (meaning by *radiata* the var. *eboraci*, which, until the introduction of Mr. Harrison's form, was erroneously called *radiata*) only occurred in a timber-yard close to the railway station between the years 1860 and 1870, may have been correct at that time, although from the evidence I have obtained of its present distribution I very much doubt it. However, it certainly would not hold good at the present time, as the var. *eboraci* or York form is and may be bred from larvæ collected in any part of the city or outskirts, but is most certainly not so common as one would infer from Mr. Porritt's notes on the radiated varieties of the genus *Arctia*, where that gentleman states the var. *radiata* (meaning the var. *eboraci*) is not at all uncommon about York.

Among some 150 *lubricipeda* bred this season from York larvæ, I only got three specimens of the var. *eboraci*, two males and one female; in addition to these some twenty intermediate varieties. Forms of *lubricipeda* much darker than the type and approaching, but still distinct from, *eboraci* as figured, are certainly not of uncommon occurrence, when the species is bred in considerable numbers. These forms also occur fairly commonly at Hull and Darlington. I recently inspected the grand lot of varieties of *lubricipeda* bred by, and now in the possession of, Mr. George Jackson, York; his series consisted of 15 rows, each row having from 20 to 22 specimens, or some 315 examples in all. About 50 were true *eboraci*, as figured (Entom. xxvii. p. 205); the remainder were principally varieties, very closely resembling *eboraci* and connecting that form with the type. The whole of these fine forms had been selected by Mr. Jackson from many thousands of *lubricipeda* which he had bred during the last few years.

Var. *fasciata*.—Mr Jackson had numerous examples, both male and female, of this form, and several very nearly approaching it. This variety also occurs not uncommonly at Scarborough, Hull, Darlington, and Driffield. Some half-dozen examples had the hind wing marked very much like those of the var. *radiata*, and the fore wings not so strongly marked as in *eboraci*. For this variety, which is recurrent, and of which I have two in my collection from Hull and Driffield respectively, and which also occurs at Darlington, I would propose the varietal name of *semiradiata*. Another uncommon variety has five small dots on each of the fore wings arranged as follows: one in centre of costa, two near the tip, and two in centre of inner margin; hind wings spotless. Five of the specimens were very interesting varieties, and quite distinct from either *eboraci* or *fasciata*, being identical with figure 1 E on plate 76 of Barrett's 'Lepidoptera'; indeed, this figure is drawn from a specimen formerly in the possession of Mr. Jackson. This form is most certainly much rarer than any other of the known varieties, excepting perhaps that extremely rare aberration in which the spots are almost if not entirely wanting from both front and hind wings, of which Mr. Jackson possesses two examples. The only immaculate specimen I have seen or heard of is that in the possession of Mr. Capper, of Liverpool, which I had the pleasure of viewing when looking over that gentleman's magnificent collection in August, 1893; probably this specimen is unique; it is a white female. Mr. Jackson has reared *lubricipeda* from larvæ collected all round York, and not merely from one particular locality, for the past thirty years, and during the past twelve years especially, in great numbers; but he has never bred *radiata*, nor any form very nearly approaching it. Mr. Robert Dutton, of this city, has some twelve examples—seven males and five females—of var. *eboraci*, and one or two of the var. *fasciata*, as well as numerous intermediate forms; these he had selected from a great number of specimens reared from York larvæ. In the collection of the late Mr. Robert Cook, of this city (which, through the kindness of his widow, I recently had the opportunity of inspecting), there are three or four varieties corresponding to *fasciata;* one of these had both fore and hind wings of a uniform dark ochreous colour, the fore wings especially so. There is a very similar specimen, only with not such pronounced markings, in the Allis collection.

I have this year bred some 500 *lubricipeda* from larvæ and pupæ obtained from Hull, and from these some very nicely marked forms resulted, including two examples of the var. *eboraci*, both females, and some half-dozen *fasciata;* also an example (a female) having the hind wings similar to *radiata*, *i. e.*, smoky black, the basal area, wing-rays, and fringe being cream-coloured, the head and thorax cream-coloured, body yellow, with six black spots down the middle and on each side, antennæ simple, fore wings rather thickly marked. This is the variety for which I propose the name of *semi-radiata*. I have a very similar specimen, also a female, taken at rest, near Driffield, but this has the fore wings typical. Nearly all the forms I selected from the Hull lot have this feature peculiar to them, *viz.*, that the hind wings are much more thickly marked in the female than are the York forms.

Mr. Fletcher, writing of the variation in specimens of *lubricipeda* from Hull, says:—"From the Hull pupæ of *lubricipeda* I bred some strongly-marked specimens in 1893. Luckily I had a pairing of two of them, and have bred this year several moths of the *fasciata* type, and the rest of the batch with well-pronounced tendencies towards it. From two of the best-marked specimens I have again obtained pupæ."

Mr. Porritt, by crossing a female *fasciata* with a male *radiata*, produced specimens of *radiata* forms nearly approaching *fasciata* and var. *eboraci*, thus showing that heredity holds good in this species. Mr. Tugwell suggests that the York city form resulted from just this kind of cross, and, after fully considering the *pros* and *cons* of the suggestion, I think it the only satisfactory explanation to be arrived at.

The Rev. C. D. Ash, Skipwith, near Selby, informs me that in 1880 he "took, on the sandhills a little north of Mablethorpe, a male *lubricipeda* almost identical in markings with var. *eboraci*; the ground colour was very pale, and the black streaks on the costa and inner margin were not so pronounced." At Saxby, Lincolnshire, in 1893, he only found the type. The Rev. G. H. Raynor, Panton Rectory, Wragby, informs me that he "has never taken any varieties of *lubricipeda* in Lincolnshire."

Mr. Allan Nesbitt, of Llandago, Chepstow, says that *lubricipeda* varies little with him. Mr. D. Chittenden, of Ashford, Kent, says that specimens of *lubricipeda* which he has bred from Ashford and neighbourhood are very much lighter than some selected examples which I sent him.

With regard to the all-important question which has been and is repeatedly asked me by very many entomologists, *viz.*, "Do you think the introduction of *radiata* to be genuine?" in order that no misunderstanding may exist as to what I believe or do not believe, I may say, as the result of all my investigations, I am firmly convinced that it is genuine, and that Mr. Harrison is entitled to our warmest congratulations for his marked and well-merited success. Mr. Harrison has still another and perhaps more interesting surprise in store for us, the result of careful artificial selection on his part; this I will leave him to announce, and merely add that the species selected belongs to the same interesting genus. In conclusion, I desire to thank most heartily all those gentlemen whose names I have mentioned in this paper, also very many whose names do not appear, for the material aid they have rendered me, both by their kind and ready replies to my enquiries, and for affording me special facilities for the inspection of their collections.

THE SENSE ORGANS OF INSECTS: A SPECULATION.

By John Watson.

Mr. Arkle, referring to the senses of Lepidoptera (Entom. xxvii. 338), says, "There is no evidence in favour of an additional sense existing; there is no organ we can point to for its exercise; there is, in short, no need for it." I would say in answer to this, What about the antennæ? That there is some special function attached to that of the male is evident, or why such very specialised development in this sex as against that of the ordinary female? There is no need for this development for the purpose of scent, because, as shown by Mr. Arkle, scent can only be demonstrated to the animal through its breathing-organs; and *touch* is as necessary to the female as to the male, for where we find antennæ used for touch we find these organs equally developed in both sexes, as in Rhopalocera, Hymenoptera, &c.

That there is no impossibility in the possession of an additional sense, we have proof in the pituitary body of vertebrate embryos found at the *anterior part of the nervous system*, and which cannot now be accounted for other than as the last vestige of an organ functional to a sense *now* unknown to vertebrates, but possessed in full vigour by the vertebral prototype. If there be another sense, it is possible it is located in the antennæ. That a structure originally developed for one special function can become partly or wholly atrophied, and later take on a function entirely different from its original one, we also have abundant proof. One of the gill-clefts of fishes, found in the highest developed fishes as merely slits and functionally used in *breathing* water, is found in all vertebrates higher developed than fishes, as the Eustachian tube and the meatus auditorius, quite open in some rare cases, and, in cases of fracture of the tympanum, as a tube from the throat to the external ear; the external half of this cleft has been diverted from its original function to that of a sound-channel, to carry the vibrations from the external ear to the tympanum, which is a thin film dividing the tube, so that sound-waves coming along it strike the tympanum and cause it to vibrate. When, through shock or concussion, the tympanum is fractured, air or fluid in the throat can be forced along this Eustachian tube through the ear; this act is analogous to the expulsion by fish of water in their mouth through their gills.

Mr. Arkle says that Lepidoptera do not hear; that a gun report does not startle them, it produces no symptoms of alarm. Is it not possible that there are qualities of sound to which these insects are sympathetic, and that such qualities have not yet been produced by artificial means, and are beyond the power of human ears to record? This is merely a speculation as perhaps bearing on the use of the antennæ, as we know that the very piercing squeak of the bat has so many vibrations to the second in its harmonic composition that it is beyond the power of the ordinary human ear to become sympathetic with it, and therefore the squeak is inappreciable usually to our ears.

That it is not beyond the region of possibility that the antennæ of Heterocera play some part in the exercise of hearing is borne out by the investigations of Mayer, Landois, and Hurst in regard to *Culex*, the gnat. It is now admitted that the singing of the gnat over one's head in the damp lanes is merely the call of the female for the male; this has been investigated in the living subject by Mayer and Landois, and histologically demonstrated by Dr. C. Herbert Hurst, of Owens College, Manchester.*

There is at the base of the antenna of the male gnat a cup-shaped process, the highly pectinated antenna emerging from the centre of the base of it. This cup is the external *ear*, and is intimately connected with the nervous system. When a note is given out, harmonically designated UT_4 (512 vibrations to the second), either naturally or artificially produced by a tuning-fork, and the axis of the antenna is pointing in the direction from which this sound comes, then the fine pectinations (setæ) of the antennæ vibrate in unison to the sound-waves. This causes the shaft of the antenna to contract and elongate with the vibration, and thus a stimulus is set up and transmitted by the nerve of the antenna to the very large cerebral ganglia.

Landois has demonstrated that the female gnat has attached to the spiracles two filaments (analogous to the vocal cords of vertebrates), and, as in vertebrates also, when air is forced through them, a sound is produced which has also 512 vibrations or thereabouts to the second. Now let us apply the two things together: suppose a gnat (female) is in a room, singing her song of UT_4; if there is in the room and within radius of the penetration of this note a male, and its antennæ are pointing in the direction of the female,—and we have plenty of evidence that they will soon do this, as its antennæ are hardly ever still, but always *feeling* for its mate's song,—then the setæ are set vibrating, which is communicated down the shaft to the ear and from the ear to the nervous system; thus the male is apprised of the nearness and direction of its mate. This susceptibility to sound of the male antenna has been beautifully worked out by Mayer; Dr. Hurst (*l. c.*) says, "Mayer has performed some experiments which throw a good deal of light on both these questions. Having fixed a male gnat upon a slide, he examined the hairs on the shaft of the antenna, and found that when certain notes were sounded with tuning-forks certain hairs vibrated so that their outlines became indistinct, and this effect was most marked when the tuning-fork UT_4 was sounded, giving 512 vibrations per second, this note setting the greatest number of the large hairs in violent vibration, but only when the sound came in such direction as to strike the hairs at right angles, or nearly so—that is to say, these hairs vibrate when this sound is produced at a point towards which the antenna is pointing."

Mr. Arkle says, "But assembling is evidently habitual in species without these very antennæ"; and I would add to this that *scent* is not, evidently, the *only* determining influence in assembling, for the Rev. G. H. Raynor (Entom. xxv. 121) says that "even during a stiff breeze I have seen males come up from all quarters of the compass." This would imply that scent was not the only lure, and tends towards proof that some other influence was at work, as *scent* cannot travel against the wind, and in all the assembling expeditions I have been on, the males always came against the wind; and when, in their eagerness, the males overshot their mark and went past the female, they lost the scent and flew up, soared away on the wind, dropped close to earth again, and then, having regained the scent, came sailing along.

---

* 'Transactions of the Manchester Microscopical Society,' 1890, "On the Life-history and Development of a Gnat,' by C Herbert Hurst, Ph. D.

The fact, as stated by Mr. Arkle, that the report of a gun does not disturb insects, would help out the fact that *if* Heterocera can hear, it must be some sound whose composition is the antithesis to that of a gun-report, *e. g.*, one which will be shriller, having more vibrations than a gun-report, and therefore in its character something in the way of the song of the gnat.

MACRO-LEPIDOPTERA OF THE BURGHCLERE DISTRICT IN 1894.

By E. G. Alderson.

In spite of very uncertain weather and a general prevalence of cold winds, the season of 1894 afforded me far better sport than I was able to get in the wonderfully hot and dry summer of 1893. There was more variety in the species taken, and from April to October there was a steady succession of seasonable captures. Here, in 1893, we had a brilliant but very short period of prosperity, with *Macroglossa fuciformis*, *Bombyx rubi*, *Melitæa artemis*, and other good things all out a full month before their time; and then, with the dull weather in July, the stream of insect life seemed suddenly to dry up, and autumn species, as far as I was concerned, were a complete failure. Perhaps the extraordinary heat told upon the collector as well as upon the insects, and want of energy may have had something to do with the empty setting-boards of August and September; but the fact remains that the autumn of last season was in striking contrast, and brought a number of very acceptable species.

The range of my observations extended as far as Winchester on the one hand and Savernake on the other. The occasional excursions, not half a dozen in all, which I made to these places, added very little to my list, which is practically made up of species taken in the garden attached to my lodgings—most of them by light, at the window of the room where I am now writing.

Winchester and Savernake, in fact, only gave me one capture each that was worth recording. On June 16th, at St. Catherine's Hill, I took *Lycæna adonis* for the first time, and saw, but failed to catch, *Callimorpha dominula*. A visit to Savernake on August 18th—a horribly dull and windy day—produced four *Thecla w-album*, all taken in one spot—a little clearing which contained a patch of thistles. On these thistle-heads the hairstreaks kept company with a very lively colony of *Charæas graminis*. Whether owing to the spiky nature of thistles, or to the bustling and pugnacious habits of their neighbours, the four hairstreaks were all sadly battered, and not one of them was worth setting.

I noticed some two dozen species of Rhopalocera at Burghclere. The best of these were *Colias edusa*, a fine fresh male, on August 13th; *Satyrus semele*; *Vanessa polychloros*, which was plentiful after emergence from hybernation in the spring but scarcer later on; *Lycæna corydon*, *L. alsus*, *L. agestis*, all abundant on Beacon Hill; and a few *Pyrameis cardui*. I had noticed in 1893 a regular brood of small *Anthocharis cardamines*; I have an entry under May 10th, recording the capture of three individuals that morning, none of which exceeded *L. alexis* in size. The discussion upon this variety induced me to try and obtain specimens this season, but though the type was abundant as ever, only one dwarf could be found, and, except in point of size, it presented very little variation from the average male. The most striking difference appeared to lie in the great comparative size of the green marblings on the hind wings beneath. These were nearly as open as in the type, and had an unusual effect in so small an area. The black spot on the fore wings was well within the orange tip.

Sphinges were disappointing, but of the genus *Smerinthus* I got two, *S. ocellatus* and *S. populi*, both taken at light. *Macroglossa fuciformis*, *M. stellatarum*, and *Chærocampa porcellus*, all of which I found in 1893, did not appear. The weather was very bad when they were due, and the same cause may have been fatal to *Bombyx rubi*, which swarmed last year from April 24th. *Hepialus humuli*, *hectus*, and *lupulinus* were very common; of the last I got a fine white variety. *Lithosia mesomella* and *L. complanula* were both taken at light. *Euchelia jacobææ* was rather scarce, but *Chelonia plantaginis* was abundant at Beacon Hill. I got *Odonestis potatoria* at light, and in April netted a few *Saturnia carpini*, which however was by no means so abundant as in 1893.

Among the Cuspidates *Cilix spinula*, *Platypteryx falcula*, *Ptilodontis palpina*, and *Notodonta camelina* were all that my lantern could beguile, and they came but very seldom. The bulk of my visitors were Noctuæ, and this was fortunate, for sugaring was not an atom of good. From April to October, on nearly all dark nights my room was sounding like an æolian harp, from the time that the lantern first appeared in the window up to one o'clock a.m. It was often almost impossible to read with comfort, and I would lay down my book to listen to the babel of undertones that filled the air. What differences of moth temperament are revealed by the deep bass hum of the heavy Agrotidæ, the vulgar bluster of *Heliophobus popularis*, and the gentle, nervous fluttering of *Rusina tenebrosa!* But to quit sentiment and come to reality, I may say that under all these various and superficial characteristics there seemed to lie a general disposition to oblige, and very soon every available inch of my setting-board was crowded with my nocturnal visitors. My first reception, so to speak, was held on March 29th, when *Tæniocampa instabilis* and *T. cruda* came in, quickly followed by *T. stabilis*, *T. gothica*, and some early Geometers. The moths were capricious, but on most suitable nights there was a fair show, and the muster was irregular in quality rather than in quantity. The lantern generally filled the room with moths of some sort, even if nine-tenths of them were of some one plebeian species like *Agrotis exclamationis* or *Arctia lubricipeda*. But on occasional evenings it would be apparent from the very first that variety was about to exercise its charm. Such pests as *Agrotis exclamationis* and *Xylophasia polyodon* would retire, and the first half-dozen arrivals would be of different species, some of them, perhaps, new to me. Chiefly by the help of a few such precious occasions I managed to put together the following list of Noctuæ:—

Leucania conigera, *L. lithargyria*. *L. comma*, *L. pallens*, *Tapinostola fulva*, *Hydræcia nictitans*, *H. micacea*, *Xylophasia lithoxylea*, *Neuria saponariæ*, *Heliophobus popularis*, *Apamea testacea*, *Luperina cespitis*, *Apamea gemina*, *A. oculea*, *Miana strigilis*, *M. fasciuncula*, *Grammesia trilinea*, *Caradrina morpheus*, *C. alsines*, *Rusina tenebrosa*, *Agrotis segetum*, *A. exclamationis*, *A. cinerea*, *Tryphæna orbona*, *Noctua augur*, *N. plecta*, *N. c-nigrum*, *N. festiva*, *N. dahlii*, *N. rubi*, *N. xanthographa*, *Anchocelis rufina*, *A. pistacina*, *A. lunosa*, *Scopelosoma satellitia*, *Xanthia cerago*, *X. silago*, *X. ferruginea*, *Tethea subtusa*, *Dianthœcia carpophaga*, *D. capsincola*, *D. cucubali*, *Hecatera serena*, *Miselia oxyacanthæ*, *Phlogophora meticulosa*, *Hadena adusta*, *H. dentina*, *H. oleracea*, *H. thalassina*, *Abrostola urticæ*, *Plusia chrysitis*, *Amphipyra tragopogonis*, and *Catocala nupta*. Besides these captures at light, I extracted from the long grass under my windows plenty of such day-flying Noctuæ as *Heliothis arbuti*, *Phytometra ænea*, *Euclidia glyphica*, and *E. mi*.

My best captures in this group were undoubtedly *Agrotis cinerea* and *Luperina cespitis*. Of the former I only got two early in June, but during the last week in August *L. cespitis* began to come in such numbers that its visits were tolerated rather than encouraged. Some of the specimens were very fine and strongly marked.

Light proved very useful with the Geometers also, and I took many species in this way whose presence in the neighbourhood I had never before suspected. Among those seen or captured at light were *Odontopera bidentata*, *Ennomos tiliaria*, *Himera pennaria*, *Boarmia rhomboidaria*, *Strenia clathrata*, *Lomaspilis marginata*, *Oporabia dilutata*, *Eupithecia venosata*, *E. centaureata*, *Lobophora polycommata*, *Hypsipetes elutata*, *Melanthia ocellata*, *Melanippe unangulata*, *Anticlea derivata*, *Cidaria propugnata*, *Scotosia dubitata*, *Cidaria miata*, *C. truncata*, var. *centum-notata*, *C. testata*, *C. dotata*, *C. fulvata*, *Eubolia cervinaria*, *E. bipunctata*, and *Anaitis plagiata*. Besides these, I beat up or netted in the evening, *Venilia maculata*, *Ellopia fasciaria*, *Crocallis elinguaria*, *Pseudoterpna cytisaria*, *Iodis lactearia*, *Asthena candidata*, *Acidalia remutata*, *Corycia temerata*, *Macaria liturata*, *Bupalus piniaria*, *Aspilates strigillaria*, *Emmelesia affinitata*, *E. decolorata*, *Eupithecia nanata*, *Cidaria suffumata*, *Eubolia mensuraria*, and many others. The neighbourhood is, I am convinced, specially rich in Geometers, but I could not work them adequately.

My experiences of mothing with a light were often very puzzling and contradictory. Some dark nights were quite unproductive, and some moonlight nights gave me a good variety of species. I used to light up about 7.30 in spring and in autumn, and at 8.30 in summer; and though I tried many experiments, the results seemed to prove that it was useless to begin earlier. If I did, the moths still appeared at the old time, with a regularity that almost suggested their expectation of the light at a fixed hour. The only rule that seemed to hold good in all cases, however, was that whatever might be the weather in temperature, a great falling off was always noticeable between 9.30 and 10.30 p.m.; and, curiously enough, the moths that had already got into the room punctually observed this hour of repose, and settled down quietly upon the walls and ceiling. A fact which to me became very significant was, that if these sleepers became restless during the quiet interval, the disturbance nearly always immediately preceded a fresh arrival from without. So regular was this correspondence, that if any of the moths which dotted my walls and ceiling began to move during the quiet hour, I always took up the net in anticipation of the sharp tap at the window which announced a new comer,—an anticipation which seldom failed to be realised immediately.

Burghclere, Newbury, Dec. 10th, 1894.

THE COPROPHAGOUS LAMELLICORNS: A LIST OF SPECIES BELONGING TO THE GENERA *CIRCELLIUM* AND *SCELIAGES*, WITH NOTES ON ATEUCHIDÆ.

By John W. Shipp.

Circellium, *Latr.*

Règne Anim. 2nd ed. iv. p. 535 (1829); Lacord., Gen. Coléop. iii. p. 70; Blanch., Cuv. Règne Anim. i. p. 292 (1854).

1. *bacchus*, Fb., Sp. Ins. i. p. 32; Mant. Ins. i. p. 17, n. 163; Herbst, Käfer, ii. p. 297, t. 19, f. 4; Lacord., Gen. Coléop. iii. p. 70; Oliv., Ent. Col. i. p. 153, pl. 17, f. 161; Blanch., Cuv. Règ. Anim. pl. 39, f. 4.

hemisphericus, Pallas, Icon. p. 20, t. B, f. 23.

var. *lyceus*, Westw., Brit. Cyclop. ii. p. 55; Reiche, Ann. Soc. Ent. Fr. 1842, p. 81; Lacord., Gen. des Col. iii. p. 70.

var. *waterhousei*, mihi.

Hab. 1, 3.—Cape Colony (widely distributed); Transvaal; Natal; Zambezi River; Matabili-land.

Only the above species has been described as belonging to this genus, which is easily distinguished from the other Ateuchidæ and Copriidæ by its hemispherical shape and its obtusely rounded clypeus. The var. *lyceus* was applied by Westwood to the large shining examples of *bacchus*, but as this is no distinguishing feature the name will probably have to become a synonym.

I have just had the opportunity of examining a series of insects captured in Matabili-land during the recent outbreak, and was struck with a few extremely diminutive forms of *bacchus*; and, as all of them are without exception under 16 lines, I take the opportunity of describing it as follows:—

bacchus var. *waterhousei*.—Size smaller, punctures on disc of thorax thick, coarser round base and margins, the posterior margin strongly sinuate. The striæ on the elytra deeper, and the basal portion of the elytra not crenulate as in *bacchus*, of a dull black colour, the hind tibiæ being furnished with a number of short spines very close together, and more numerous than in *bacchus*; the spines or teeth in one or two examples are obsolete, being evidently worn away by friction; the carinæ on the metasternum scarcely visible and almost obsolete; metasternum impunctate. L. c. 15 lines (16 = 1 in.). Hab. Matabili-land.

Sceliages, *Westw.*

Proc. Zool. Soc. v. 1837, p. 12; Westw., T. Z. S. ii. p. 159 (1838); Lacord., Gen. Coléop. iii. p. 71.

1. *adamastor*, Serville, Encycl. Méth. x. (1825), p. 351; Lacord., Gen. Coléop. Atl. t. 26, f. 2.
   microcephalus, Boh., Ins. Caffr. ii. p. 174.
   iopas, Westw., P. Z. S. v. (1837), p. 12; T. Z. S. ii. p. 159, t. 29, f. i. (1838).

1.—Cape Colony; C. Good Hope; Port Elizabeth; Natal; Caffraria.

2. *hippias*, Westw., P. E. S. (1844), p. 100; T. E. S. iv. (1847), p. 226, pl. 17, f. 2.
   Hab. Cape Good Hope; Afr. Merid.

3. *gagates*, n. sp. Limpopo River.

I. Clypeal teeth rounded at extremity; size smaller.
   A. Species larger; finely punctured (in some cases the punctures are almost obsolete); elytra with the striæ only faintly visible, depressed on disc, and more elongate . *adamastor*, Latr.
   B. Species smaller; striæ of elytra deeper, elytra more convex and rounded, not so depressed on disc . . . . . . *hippias*, Westw.
II. Clypeal teeth sharply pointed at apex; size larger; mesonotum with a deep longitudinal furrow . . . . . . *gagates*, mihi.

gagates, mihi.—Black, shining. Head not elongate; teeth quite pointed, centre indentation quite triangular, the teeth being slightly reflexed. Head strongly punctured, except on disc, where it is quite smooth; strongly margined. Thorax strongly but finely punctured at sides, sparingly on disc, the punctures being thicker in the anterior angles; strongly emarginate. A faint longitudinal line can be plainly seen on disc. Anterior angles of thorax only slightly produced. Cilia at the base of the thorax rather long and deep brown. Elytra six-striated, the striæ being shallow but distinctly visible, rather strongly punctured; interstices flat, very sparingly and finely punctured. Elytra depressed on disc, base bicarinate. Anterior tibiæ very strongly toothed, all the teeth being sharply punctured and squamose at tips; the dentations very strongly serrated, the inner margins being unevenly serrated. Mesonotum not punctured, with a deep longitudinal furrow. L. c. 14 lines. Hab. Limpopo River.

adamastor, Latr. = *iopas*, Westw.—Black, shining. Clypeus elongate, depressed, six-lobed; the two centre teeth rounded, semicircular in shape, strongly emarginate. Head obsoletely margined, covered with small irregular punctures, except on the posterior portion, where the punctures are obsolete. Thorax smooth, obsoletely punctured, strongly margined, with the margin serrated, and with a testaceous cilia; upper margin smooth. Elytra furnished with six striæ, the striæ being almost obsolete, and the elytra very faintly punctured; in a few cases the punctures are indiscernible. Apex of anterior tibiæ bent inwards at extremity and dilated, the teeth being slightly deflexed and serrated; the apical tooth rounded at extremity, not pointed. Mesonotum rather thickly punctured with very fine punctures, and with an obsolete longitudinal furrow, in some cases smooth, slightly concave or depressed towards posterior extremity. L. c. 10 to 12 lines.

Westwood described *iopas* as follows:—"Ater, nitidus, lævis; clypei dentibus intermediis, duobus obtusis subelevatis, capite antice punctatissimo; thorace lævissimo; elytris punctis nonnullis minutissimis, irregularibus, striisque sex longitudinalibus simplicibus fere obliteratis. L. c. 10 lines."

hippias, Westw.—The description of *hippias* is as follows:—"Niger, nitidus, capite sub lente tenuissime punctato; clypeo cornubus duobus intermediis porrectis; pronoto fere lævi, elytrisque sublævibus et minus nitidis, singulo striis sex vix discernendis; tibiis anticis haud in medio angulatis, extus 4-dentatis et serrulatis, metasterno antice producto et convexo-prominulo. L. c. 8 lin." Distinguished from *adamastor* by its less dilated form, as well as by the above-mentioned characters.

I confess that I fail to perceive any distinction between *adamastor* and *iopas*; a specimen in the Hope Coll. is labelled *adamastor*, but is only a trifle larger than those labelled *iopas*, and does not differ in any other particulars. *Hippias* is certainly a smaller and rounder insect than either of the two preceding species, with its form more convex. Lacordaire's figure of *adamastor* is evidently taken from Westwood's figure of *iopas*.

NOTES ON THE ATEUCHIDÆ.

In my paper on the above genus (Entom. xxvii. 257) I stated that no species of the genus had been found upon the island of Madagascar. Since then, on looking through the Nat. Hist. de Madagascar Ins. Col., I find that D'Herculais has figured a species (pl. 17, f. 1), which is named *radama*. No description is as yet given, but the species does not seem to be identical with any of the East African examples. It is of a shining fuscous-brown colour, and sparingly punctured.

Herr Reitter (Verh. Vereines. Brunn, xxxi. pp. 160-163) gives the following as the synonymy of the Palæarctic species:—*Sacer*, Linn. = *typhon*, Fisch. = *carinatus*, Gebl. = *europæus*, Mots. = *acuticollis*, Mots. = *affinis*, Brullé = *retusus*, Brullé. *Pius*, Ill. = *infirmus*, Fisch. = *monachus*, Fald. = *digitatus*, Mots. *Puncticollis* = *armeniacus*, Mem. = *hypocrita*, Dej. = *parumpunctatus*, Klug.

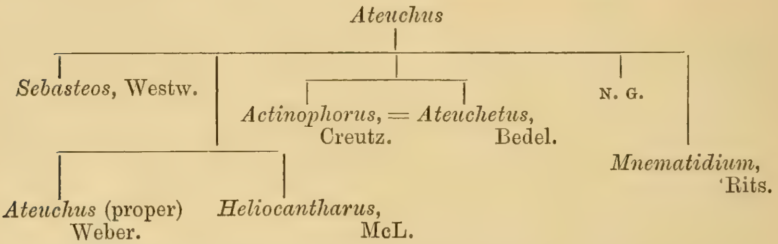
The genus *Mnematidium* was founded by Ritsema in 1889 for the name *Octodon*, Lansberge,* but Reitter uses Bedel's name

* See the Synonymy (Entom. xxvii. 314).

Neoctodon for *multidentatus*, Klug. This is an error (Entom. xxvii. 314). Reitter, however, uses Ritsema's genus *Mnematidium* instead of *Mnematium*, McLeay (*ritchei*, McLeay = *silenus*, Oliv.). This is also incorrect, as *Mnematidium multidentatum* is greatly dissimilar to *Mnematium ritchei*, McL. *Mnematium*, McLeay, and *Pachysoma*, Kirby; belong to the second division of my section Ateuchini, having the head and thorax very convex, more rounded, and shorter, and with the body wingless.

Bedel's subgenus *Ateuchetus* includes such forms as *cicatricosus*, Lucas, *puncticollis*, *semipunctatus*, and *variolosus*. These species agree with *Actinophorus*, Cr., as restricted by Erichson and others, although the genus *Actinophorus*, as given by Erichson, will bear dividing up into two distinct groups.

I append a diagram showing how the present genus *Ateuchus* may be divided :—



The following specimens are not mentioned in my list :—

ganglbaueri, Reitter, Verhandlung des Naturf. Vereines in Brunn, xxxi. (1892), p. 162. Hab. Persia.
laticollis, Linn.
  var. *striolatus*, Reitter, *l. c.*, p. 163. Hab. Italy; Morocco.
  var. *semilunatus*, Xambeu, Ann. Soc. Ent. Fr. vol. 63, Bulletin, p. ccxxvi. Hab. Pyrenees.

THE IRREGULAR DIARY OF AN ENTOMOLOGIST, 1832—1860.

Some time ago Mr. W. T. F. M. Ingall most kindly sent me a type-written copy of some entomological memoranda made by his father, the late Mr. Thomas Ingall, formerly of the Bank of England, and one of the original members of the Entomological Club, and also of the Entomological Society of London.

As was the case with many of his contemporaries, Mr. Ingall did not confine himself to any particular order of insects, but collected anything that came in his way—Coleoptera, Diptera, Hymenoptera, Lepidoptera, and Neuroptera seem to have been equally interesting. Read by the light of our present knowledge of the insects referred to in his diary, many of the entries therein are very interesting, and as the gentleman to whom I am indebted for a copy of the diary has very courteously given me permission to publish extracts therefrom, I have selected the following:—

"August 1st, 1832. — To-day I have obtained from Mr. Lambert a most extraordinary specimen of *Limenitis camilla*, the upper surface of which has only a very small portion of the usual white bands which cross the wings. It is on the right posterior wing; beneath, nearly the whole of the white band and markings are wanting. I gave him 1s. for it. It was taken at Colchester, in Essex, and he informs me that he also saw one other similar, but was not fortunate enough to take it. The insect was very numerous this season, but owing to the high wind he did not take many." When we remember that in Haworth's time *L. sibylla* was known in England as "*L. camilla*," we shall understand that the purchaser had not been "taken in," but on the contrary obtained a good variety at an exceedingly low figure, if comparison is made with the prices such examples realise at the present day.

"August 25th, 1835.—Mr. Bennett informs me that the pale clouded yellow (*Colias hyale*) has been taken within the last few days, in some fields to the right and left of the bridge over the canal at New Cross. Mr. B. has taken three specimens at Box Hill this year."

"September 10th.—Went to Mr. Newman's. He gave me a worn specimen of *C. hyale*, which he took in the above locality with eight others. He knows a man who took seventeen others at the same place and about the same period. Altogether he has heard of fifty-one specimens taken in different parts of the country, and *C. edusa* in profusion near Gravesend. Last Sunday a specimen was seen in Battersea Fields, and another at Dulwich. He has also heard of three specimens of *P. daplidice* being taken at Dover this year, and *Melolontha fullo* at Margate. *Papilio podalirius* has also, it is said, been taken—three specimens, of which Mr. Curtis has one. I last night learnt from a gentleman who was at Mr. Stephens', that the day before yesterday he saw a specimen of *Vanessa antiopa* on the borders of Epping Forest, which passed while he was in a carriage." Perhaps the most important items in these entries are the records of the two species of *Colias*. At the present time *Melolontha fullo*, perhaps better known as *Polyphylla fullo*, is not recognised as British, and *Papilio podalirius* is not placed on our lists as a native.

"July 3rd, 1836.—Took a cocoon of *Clisiocampa* [*Bombyx*] *neustria* which contained two pupæ, male and female. I could not perceive the exuvia, when I tore open the cocoon, of more than one larva. I will not however positively assert there were no more, as it is possible it may have dropped out at the moment of tearing the case open and escaped my observation; but there certainly was only one case for the two pupæ."

"July 9th.—Mr. Bennett gave me two specimens of *Pieris* [*Aporia*] *cratægi*, both males; two of *Abraxas ulmata*, and one *Gnophria rubricollis*, all taken at Ross in Herefordshire, within the last month."

"May 25th, 1841.—About two years ago Mr. Ed. Doubleday gave me an old honeycomb and beehive, from which I bred a specimen of *Galleria alvearia* [*Achrœa grisella*]. It was afterwards thrown aside in a cellar, but the other day I accidentally discovered one of the moths in the house, and on going to the hive found them in abundance. I have bred at least 400 specimens."

"June 7th.—Received from Mr. H. Doubleday, who is now at Whittlesea Mere, a small box by post with five larvæ of *Lycæna dispar*."

"June 20th.—About three or four days ago one of the above went into chrysalis, but two appear to be dead. Mem.—Of the five larvæ I bred a male and female; one larva died and two produced ichneumons."

June 6th, July 23rd, and July 30th, 1842.—The entries under these dates refer especially to large numbers of *Bombyx castrensis* from the Isle of Sheppey, and his difficulties in rearing them. He appears, however, to have been fairly successful, as by other entries it seems that he bred sixty male and thirty-five female specimens, together with a gynandrous example recorded as follows:—

"August 7th.—Bred one hermaphrodite. This extraordinary specimen has the left half the appearance of a pale male, and right a dark female. The division of colour on the thorax is very apparent. The upper part of the body is of the same colour as the females usually are, but beneath it is longitudinally divided into dark and light, as are also the legs."

The next item in the same year is an important one, if the insect referred to was correctly identified, as the locality seems to be one not hitherto recorded:—

"August 15th.—At Shirley I took about half a dozen specimens of *Crambus latistrius*, but only one fine. I found them on the piece of waste ground by the sand pits going from Shirley to Wickham." On the 18th thirty specimens of this species were taken, "most of them in bad condition. In colder seasons they probably are in perfection about this time. I found them more widely distributed to-day."

"August 23rd.—Saw Samuel Stevens to-day and find he has taken fifty-one specimens of *Colias hyale*, which has made its appearance in the following places this year [1842], and in some abundantly:—Epping, St. Osyth, Chalk, Deptford, Highgate, Arundel, Yorkshire, Northampton."

Under the date of September 5th "a specimen of *Catocala fraxini* which Mr. S. Stevens took at Hammersmith off a willow, with sugar, a few evenings ago," is mentioned as having been seen at the Entomological Society.

"July 17th, 1845.—At Clapham Common, this morning, I took one or two specimens of *Agrotis corticea* by beating the limes, but I ought to have gone two or three days ago. Some of my larvæ of *castrensis* [taken at Sheppey on the 11th and 12th] have spun up, but others are dead. A considerable number of *Æ.* [*Sesia*] *ichneumoniformis* have been taken at Charlton within the last fortnight. Mr. Shepherd took sixteen in one afternoon. Last week Mr. Douglas took *Smaragdarius* [*Phorodesma smaragdaria*], one of the emeralds, at St. Osyth; five were taken. It probably may be met with at Sheppey, on the east coast. Mem.—Endeavour to get to Sheppey for a week next year, about the beginning of July. A new *Eupithecia* [*togata*] has been taken at Black Park within the last three weeks, and in considerable numbers."

"July 31st.—I find my *castrensis* caterpillars will eat oak. They also seem to like the common wormwood better than the garden southernwood. I find they do not dislike the latter plant when it has been dipped in salt and water."

"June 16th, 1856.—I have bred about twenty specimens of *Talæporia pseudo-bombycella* from pupæ-cases principally collected on the trunks of beeches in the Addington and Wickham woods. Some few were taken on the Dartford fence. Only three were females. This afternoon I accompanied Mr. Stainforth to Kingston-on-Thames. We obtained a boat near the bridge and rowed to a small island, a little higher up the river. It is covered with osiers, and on the margin of the island we cut off some of the heads of the osiers and brought home for the purpose of feeding *Ægeria* [*Sesia formiciformis*, subsequently bred therefrom], Mr. Stainforth having bred several last year. We noticed one or two pupæ in holes, but not any of the perfect insect."

"June 21st.—Went again to-day to the *coryli* locality, having left London at 10 a.m., accompanied by Mr. Francis' son. We first went up Croham lane to the Hurst, and took a considerable number of larvæ and a few moths; one I had never taken before. Near Shirley Common I also took a further quantity of *Cryptocephalus coryli*, &c. From the boys at the lodges I obtained several more moths, some rather good, such as *Polia* [*Aplecta*] *tincta*. Larvæ appear very plentiful this year, particularly Geometræ. I have taken several thorns, prominents, &c. N.B.—The grounds in which I get *C. coryli* is called 'Ballards,' the residence of Hopfman, Esq. The particular locality is a piece of stony ground at the bottom of the hill at the Croydon end of Shirley Common, and surrounded by a larch plantation. The ground is covered on its surface with roundish pebbles, and is overgrown. In addition to the sallows there are young larches, birches, oaks, beeches, nuts, with a profusion of *Epilobium angustifolium* and other plants, including Orchideæ."

"June 24th.—Went down again to Croydon and took several more *coryli* and other *Cryptocephali*. N.B.—Among the moths obtained from the cottagers about this time were the following:—*Notodonta camelina, N. chaonia, Apatela* [*Acronycta*] *leporina,* probably a specimen of *Semaphora* [*A.*] *tridens; Dianthœcia cucubali?*—the purple one; twelve specimens of *Halias prasinana,* since taken by myself also; *Macaria notataria* [*notata*], *M. lituraria* [*liturata*], *Heliothis marginata* [*Chariclea umbra*], and *Abrostola urticæ* [*Habrostola tripartita*], &c."

"July 5th.—Went again to Queenboro' [previous entry July 3rd] and found larvæ of [*Bombyx*] *castrensis* in immense abundance, principally full-fed. Brought away several hundreds. They seem to revel in the moist places overgrown with grass, *Statice, Artemisia,* and other salt-marsh plants. They seem to feed freely on *S. limonium;* on that and *A. maritima* they are principally found. They were crawling about in such profusion that in many parts I could scarcely walk without treading upon them. Among the *Artemisia* I brought home there must have been a pupa of *Phorodesma smaragdaria*, as, upon opening the parcel and separating the plants, a crippled and much-injured specimen (female) crawled out. I have set it, although in very bad condition, as I had not the species in my collection."

"July 12th.—My larvæ of [*B.*] *castrensis* are spinning very fast. They eat cherry leaves dipped in salt and water voraciously. I have already from 150 to 200 spun up."

"July 24th.—A man of the name of Page, a gardener who lives at a cottage at the foot of the hill leading to 'Ballards,' has a very fine specimen of [*Vanessa*] *antiopa*, which he took off a tree opposite his house about five years ago. The tree bled very much, and *antiopa* came with many other insects to the sap. My brother has a specimen taken on the Addington hills, I believe about the same time." In a later note it is mentioned that Page sold his *antiopa* to Dr. Knapp, but the price was not stated, although it was known that 30s. had been refused for the specimen some time previous to the sale.

"July 31st.—About fifty *castrensis* have appeared [fifty emerged the previous day], principally females; I have many caterpillars yet feeding." Further entries respecting the rearing of this species show that about sixty emerged on August 2nd, and about thirty on August 3rd, while on the 21st of the month he wrote:—"I expect I shall breed no more *castrensis*, none having appeared the last three or four days. I have set about 340—114 males and 225 females," This stock seems to have been of considerable value in the way of exchange, as appears by the following entry:—

"September 13th.—Turner has called twice upon me within the last few days, and I have bought about 30s. worth of insects from him, and also gave him a dozen *C.* [*B.*] *castrensis*, and exchanged another dozen with him for insects. I have also bought about 12s. worth of insects from Argent in the last few days, and exchanged *castrensis* for others. From him I obtained sixteen *P. arion*, taken by J. Chambers at Stilton, which is near Yaxley in Cambridgeshire [there surely must have been some error here]. Mr. Doubleday also sent me to-day a box of insects, and when I went down there a few weeks ago to take him fifty *castrensis*, he also gave me about fifty good insects in return. The opportunities have added several species to my collection, which I am now rearranging, and have also enabled me to complete my series of many species of which before I had only bad specimens. My own collecting this year has also contributed much to this end."

The following entry, the last in this diary, shows the deep interest the writer took in entomology, and the careful manner in which he made his observations:—

"July 17th, 1860.—I have now been ill above twelve months and am still almost incapable of taking any exertion, but I have not been able to resist capturing a few insects in the garden. They have principally been Hymenoptera and taken within the last three or four days, for the weather has been so bad that we cannot be said to have had any summer. . . . On Friday last, the 13th, I took about fifty insects, among them twelve specimens of *Fœnus assectator*, which I had only once before met with in the garden some years ago. Only one was a female, and that I took on a flower. The others were hovering over some rotten stakes. Whilst watching a black currant bush, I observed a currant-tree *Sphinx* alight on the lower part of a dead branch and walk up it in a semi-spiral line, feeling with its ovipositor, which was fully protruded, first on one side of it and then on the other, so that it examined the branch carefully all round. After walking up in this manner three or four inches, it came to the remains of a little branch which had been cut off nearly close to the main stem, and the pith having decayed was left hollow, into which it immediately inserted its ovipositor, and remained depositing its egg or eggs about a minute, when it flew off." The currant-tree "*Sphinx*" mentioned in the above is, of course, *Sesia tipuliformis*.

RICHARD SOUTH.

THE GALLS OF *CYNIPS KOLLARI*, AND THEIR VARIOUS OCCUPANTS.

By T. R. Billups, F.E.S.

The large, round, brownish yellow galls of *Cynips kollari*, which for some years were known by the name of the "Devonshire gall," through having been first observed in the county of Devon, have been so admirably described by Mr. Fitch, in a paper read before the members of the Essex Field Club, October, 1881, and again by Mr. Cameron, in his late monograph of the 'British Phytophagous Hymenoptera' (Ray Society's Works), that it would be superfluous to say one word more upon the Cynipid or gall-maker, so I purpose confining my remarks to the numerous and varied inhabitants reared by myself from the galls during the years 1890, 1891, 1892. In the 'Entomologist' for 1872, Mr. Fitch records a long list of insects bred by the late Mr. Weston. Many of the species mentioned in that list have occurred with me, but having also reared various others not previously recorded, it may perhaps be of interest to enumerate afresh all the species bred by myself.

The galls were all collected on Weybridge Common and Chobham railway banks, from low stubby bushes, and it is only fair to say that many of them were old galls, or apparently empty ones; hence the variety of lodgers, many of which, outside the inquilines and parasites, had taken possession for pupation, &c.; in all 122 species were bred, belonging to no less than six distinct orders, namely, Hymenoptera, Lepidoptera, Diptera, Coleoptera, Neuroptera, and Arachnoidea. These I purpose to again subdivide into their different families as follows:—First, the maker of the galls, *Cynips kollari*, Htg.; these were numerous. Then the inquilines, or, as Mr. Fitch calls them, true burglars; of these we have no less than six species, *Synergus melanopus*, *pallicornis*, *vulgaris*, and *facialis*, Htg., also *reinhardi*, Mayr; these were in fair numbers, with the exception of the first named, which is considered rare in this country; I had thirteen specimens. Another inquiline, *Ceroptres arator*, Htg., I again succeeded in rearing, having previously bred this species in 1884 (see Proc. Ent. Soc. for that year) from *kollari* galls; Mr. Cameron then thinking I might have reared them from the twig galls of *Andricus noduli*, I was pleased to again obtain this rare species, in all some nine specimens, from the *kollari*, and thus cleared up a doubt of long standing. The Chalcids were very numerous, and amongst these beautiful parasites were the following species:—*Torymus regius*, Nees = *devoniensis*, Parfit, *erucarum*, Ns., *auratus*, *abdominalis*, Fons., and *cyniphidum*, Ratz., this later species being especially plentiful. *Megastigmus* *stigmaticus*, *stigma*, and *dorsalis* of Fab.; of this last species I only succeeded in rearing four specimens, two males and two females. *Mesopolobus fascirentris*, Westw., was also scarce; in all five specimens. *Pteromalus tibialis*, West. (Giraud), *naucus*, Foerst, *dissectus*, Walk. (Giraud), and two very dark species I cannot identify. *Syntomaspis caudatus*, Brischke, *dubius*, Nees, and *pubescens*, Forst., were numerous. *Telenomus phalænarum*, Nees, and *Entedon scianurus*, Rtz., were represented by six specimens of each. *Eupelmus geeri* and *urozonus*, Dalm., were plentiful. *Olinx gallarum*, Boh., three specimens only. *Eulophus lævissimus*, Rtz., and *Lamprolatus splendens*, Walk., were fairly common; but of the beautiful little Chalcid *Platymesopus tibialis*, Walk., I only bred three specimens. *Eurytoma rosæ*, Nees, and *salicis*, Thom., common; as were also *Decatoma biguttata*, Br., and *neeri*, Foerst; this last bringing the number of Chalcids to twenty-nine.

The Aculeate Hymenoptera had the following representatives:—*Trypoxylon figulus*, Lin., thirteen, and *clavicerium*, Lep., five specimens. *Stigmus pendulus*, Panz., and *Passalœcus insignis*, V. de-Lind, were equally balanced in seventeen specimens of each; while of *Crabro tibialis*, Fab., there were eleven, and of *C. clavipes*, Lin., only four. Of *Odynerus gracilis*, Brullé, I reared four specimens, two males and two females; and of *trifasciatus*, Olv., five specimens, all females. The pretty little bee, *Prosopis brevicornis*, Nyl., of which I had seven specimens, bringing the number of the Aculeata up to ten species.

The Ichneumonidæ proper were represented by no less than thirty-seven species:—*Homalus auratus*, L., eleven, *cæruleus*, Degeer, thirteen; while of *Chrysis cyanea*, Lin., there were no less than thirty-one specimens. *Phygadeuon obscuripes*, Tasch., two specimens only; while *vagans* and *labralis*, Gr., were represented by five specimens of each; and, strange to say, the specimens of *vagans* were all males, and of *labralis* all females. *Phæogenes troglodytes* and *Ischio melinus*, Gr., were each represented by six specimens. *Hemiteles bicolorinus*, Gr., and *areator*, Panz., were common; *micator* and *æstivalis*, Gr., were fairly plentiful; while of the beautiful little *imbecillus*, Gr., I only reared three examples. *Hemimachus instabilis*, Forst., and *fasciatus*, Fab., were plentiful; as were also *Pezomachus nigritus* and *rufulus*, Forst., while five specimens of *anthracinus*, Forst., were also reared. The Ophionides were represented by *Limneria femoralis* and *dorsalis*, Gr., of which there were eleven specimens; while of *exareolata*, Ratz., there were five only. Among the Tryphonides were three specimens of *Mesoleius formosus*, Gr., and five of *Exochus podagricus*, Gr., all females. The family of Pimplides having as representatives, *Pimpla calobata*, Gr., four specimens, *brevicornis*, Gr., six, and *nucum*, Ratz., eleven. *Perithous divinator*, Rossi, and *varius*, Gr., were each represented by five specimens, all females; these very beautiful insects being no doubt parasitic upon the sawfly larva, which will be referred to later on. There were also two females and one male of *Glypta incisa*, Gr., and a single female of *Lissonota segmentator*, Fab. I had almost forgotten to mention *Clistopyga incretor*, Fab., of which I reared three females and two males; and also four females of *Meniscus impressor*, Gr. Among the Braconidæ were eleven specimens of *Rhogas circumscriptus*, Nees; seven specimens of *Apanteles zygænarum*, Marshall, thirteen of *rubripes*, Hall; fifteen of *Macrocentrus marginator*, Nees, and numbers of *infirmus*, Nees. The Oxyuridæ had no less than seven species to represent them, and were as follows:—*Proctotrypes ater*, Nees, nine specimens, and thirteen of *calcar*, Hal.; while there were seven specimens each of *Megaspilus rufipes* and *Oxylabis bisulca*, Nees; of *Belta dorsalis*, Thom., five specimens were reared; but of *Synacra brachialis*, Nees, I only succeeded in finding one specimen; there were also three specimens of the genus *Aphanogmus*, which have not yet been described. Among the Tenthredinidæ or sawflies were no less than thirteen specimens of *Dineura verna*, Giraud, four of *viridi̇dorsata*, Cam., and seven of *Emphytus cinctus*, Klug.

The number of species of Lepidoptera reared were only four, and these only in small numbers:—*Ephippiphora gallicolana*, Zell., was represented by three specimens; *Heusimene fimbriana*, Haw., and *Coccyx splendidulana*, Gn., two specimens of each; and one example only of *C. argyrana*, Hb.

Diptera also showed up poorly in numbers, there being only two species:—*Homalomyia canicularis*, L., being common; and a species of *Cecidomyia* undetermined.

The order of Coleoptera was somewhat better, being represented by fourteen species, namely, *Olibrus æneus*, F., plentiful; *Coccinella bipunctata*, L., and *variabilis*, Ill., several specimens of each; *Cryptophagus cellaris*, Scop., and *Orchestes quercus*, L., numerous; *Telephorus flavilabris*, Fall., and *limbatus*, Thom., six specimens of each; *Dasytes plumbeo-niger*, Goeze, abundant; *Malthodes marginatus*, Lat., eleven specimens; *Anaspis melanopa*, Forst., and *ruficollis*, F., both species plentiful; *Cœliodes quercus*, F., and *Rhinosimus planirostris*, F., eleven specimens of each; and, lastly, *Balaninus brassicæ*, F., five specimens only.

Neuroptera was represented in the Psocidæ by three species only:—*Psocus fasciatus*, Fab., and *Stenopsocus cruciatus*, L., were fairly plentiful; while the very beautiful and fragile *Elipsocus unipunctatus*, Müll., mustered three only.

I now come to the end of my list with the Arachnoidea, of which there were several specimens of two species of spider, which I have been unable to get determined. The subfamily Acari had its representatives in *Damæus geniculatus*, Koch, and *Uropoda vegetans*, Lat., both these species being plentiful; while

Hoplophora contractilis, Clap., was in evidence, but not numerous. Altogether there were 122 distinct species; and I feel quite sure that if the galls had been picked from various localities this list might have been enormously extended. I can only hope that others may perhaps be induced by this brief note to follow up this interesting study of the inhabitants of *kollari* galls, which time will not permit me to do as I could wish.

A CATALOGUE OF THE MACRO-LEPIDOPTERA OF DERBYSHIRE.

By Fred. W. G. Payne.

It appears to me that a fitting preface to a list of Derbyshire Macro-Lepidoptera is to offer some brief observations upon the salient geological features of the district. The shire possesses the distinction of a central English situation. It has a surface of peak and plain in which the alpine predominates over the flat land, for the southern termination of the Pennine chain embraces more than half the area. Kinderscout (2000 ft.), rising from an elevated plateau, dominates other eminences scarcely inferior, and the hills (chiefly carboniferous limestone) gradually decline in height, until the southern plain is reached, the latter being bordered on the south by the river Trent. The higher hill ranges are divided by widely sweeping valleys, the lesser and well-wooded eminences being cloven by rocky ravines. The watershed is almost solely southward, the Dove running down the west boundary, the Erewash over the coalfield on the east border, and the Derwent and its tributary the Wye flowing centrally, the whole, through the Keuper area, discharging into the Trent. On the north-west side of the "divide," however, flows the Goyt. In the north-east are beds of lower red sandstone.

My warmest thanks are due to the following ladies and gentlemen who have placed their lists at my disposal, and have otherwise assisted me:—Miss M. Kimber; Miss E. M. Alderson, who has supplied me with records from the north; Rev. G. A. Smallwood; Mr. Hooke, who has forwarded his notes from the Eckington and Staveley district; Rev. R. H. Fuller, who has sent a list of species met with in the Bakewell district; and Rev. C. F. Thornewill, who has supplied me with notes and observations chiefly from the vicinity of Bakewell. I have also to acknowledge that I have quoted freely from the 'List of the Lepidoptera of Burton-on-Trent and Neighbourhood,' published under the auspices of the Burton-on-Trent Natural History and Archæological Society, and that several of the localities for the Rhopalocera are taken from Newman's 'Natural History of

British Butterflies and Moths.' I am also indebted to Mr. John Hill, a collector for more than a quarter of a century in the vicinity of Little Eaton, and to other entomological friends and acquaintances.

Papilio machaon. Newman says that two specimens were taken near Matlock by Thomas Lighton, but remarks that Mr. John Wolley afterwards explained in 'The Zoologist' that he had turned out many hundreds of this butterfly in the springs of 1843 and 1844, most of them at Matlock.

Aporia cratægi. "A nest of larvæ found by Rev. F. M. Spilsbury, in his garden at Barrow-on-Trent, feeding on apple" (Burton list).

Pieris brassicæ. — *P. rapæ.* — *P. napi.* Common.

Euchloë cardamines. Common everywhere.

Colias hyale. Newman mentions one specimen being taken at Via Gellia. — *C. edusa.* Clover-fields at Repton (W. Garneys). Newton Solney (J. T. Harris). Winshill (G. Baker). Rev. G. A. Smallwood and Mr. Hill also record it. — Var. *helice.* Clover-fields at Repton (W. Garneys).

Gonopteryx rhamni. Seal Wood, Dovedale, Repton Shrubs, and Egginton.

Argynnis selene. Dovedale (J. T. Harris). — *A. euphrosyne.* Repton Shrubs and Seal Wood (E. Brown and J. T. Harris). Bakewell, once (Rev. R. H. Fuller). — *A. adippe.* Rare. Breadsall, Dovedale, Matlock, and Cromford. — *A. paphia.* Rare. Repton Shrubs, Seal Wood, and Ankerchurch.

Melitæa aurinia, Rott., = *artemis*, Fb. Cromford is mentioned as a locality by Newman.

Vanessa c-album. Breadsall, Calke Abbey, Little Eaton, Repton Shrubs, Seal Wood. Mr. Hooke took one specimen at Handley, autumn, 1893. — *V. polychloros.* Breadsall and Calke Abbey (Newman). Little Eaton (J. Hill). Dovedale (J. T. Harris). Barrow (Rev. G. A. Smallwood). — *V. urticæ.* Common as far north as Bakewell. — *V. io.* Fairly common. — *V. antiopa.* Mr. Hill saw one specimen in 1886 in Little Eaton Park. Once at Milton (W. Garneys). — *V. atalanta.* Common throughout the county. — *V. cardui.* Common.

Pararge egeria. Seal Wood (E. Brown). Repton Shrubs (W. Garneys). Bakewell, once (Rev. R. H. Fuller). — *P. megæra.* By no means common in the south, and Mr. Fuller has only three records of it in the Bakewell district.

Satyrus semele. Rare. Dovedale (J. T. Harris).

Epinephele ianira. Common in the south. — *E. tithonus.* Recorded by Messrs. E. Brown and W. M. Anderson, and Rev. G. A. Smallwood. Mr. Hill has seen one specimen at Allestree. — *E. hyperanthus.* Common in the south-west.

Cœnonympha pamphilus. Common.

Thecla w-album. Darley, Repton Shrubs, Calke Abbey, Cubley, Seal Wood. — *T. pruni.* Newman says that Mr. J. R. Hind found this species in a box of insects captured within a few miles of Chesterfield. — *T. quercus.* Repton Shrubs and Seal Wood. — *T. rubi.* Dovedale, common, and Alderwasley.

Polyommatus phlæas. Common south, rarer north.

Lycæna astrarche, Bgstr., =*medon*, Esp. Dovedale, and abundant Monsal Dale and Lathkil Dale. — *L. icarus*, Rott., =*alexis*, Hb. Very common everywhere. — *L. argiolus*. Repton, scarce (W. Garneys). — *L. minima*, Fues., =*alsus*, Fab. Common in the central districts. Middleton Dale (Miss E. M. Alderson). Dovedale (Rev. R. H. Fuller).

Nemeobius lucina. Via Gellia.

Syricthus malvæ, L., =*alveolus*, Hb. Recorded once (Rev. R. H. Fuller).

Nisoniades tages. Common. Bakewell, Dovedale, and Lathkil Dale.

Hesperia thaumas, Hufn., = *linea*, Fb. — *H. sylvanus*. Not uncommon south.

Acherontia atropos. Occasionally throughout the southern half of the county.

Sphinx convolvuli. Common south. — *S. ligustri*. Not uncommon in the south-west.

Deilephila galii. Has been taken at Breadsall by Rev. H. A. Stowell.

Chærocampa celerio. Mr. Hooke informs me he took a specimen of this rare insect in the daytime, at rest, on the shutter of a shop near the Midland railway-station at Eckington. — *C. porcellus*. Recorded by Rev. G. A. Smallwood.—*C. elpenor*. Commonest in the larval state. The imago has been taken by Rev. G. A. Smallwood and Mr. Hill.

Smerinthus ocellatus. Fairly common south. Mr. Hooke records two from the Staveley district. — *S. populi*. Common everywhere.

Macroglossa stellatarum. Common south. Recorded from Middleton Dale by Miss E. M. Alderson, Bakewell by Rev. R. H. Fuller, and Staveley by Mr. Hooke.

Trochilium apiformis, Clerck, =*crabroniformis*, Schiff. Findern. Reported from Bakewell by Rev. R. H. Fuller. — *T. crabroniformis*, Lewin, =*bembeciformis*, Hb. Common south.

Sesia sphegiformis. Repton Shrubs (E. Brown and J. T. Harris). — *S. tipuliformis*. Common south. — *S. asiliformis*, Rott., =*cynipiformis*, Esp. Repton Shrubs (W. Garneys). — *S. culiciformis*. Seal Wood and Repton Shrubs.

Ino statices. Common. — *I. geryon*. Monsal Dale (Rev. C. F. Thornewill and Rev. R. H. Fuller). Middleton Dale (Miss E. M. Alderson).

Zygæna lonicerœ. Repton Shrubs. — *Z. filipendulæ*. Common.

Hylophila prasinana. Common in south-west.

Nola cucullatella. Common south.—*N. confusalis*, H.-S., =*cristulalis*, Dup. Repton Shrubs.

Nudaria mundana. Fairly common as far north as Bakewell.

Lithosia lurideola, Zinck., =*complanula*, Bdv. Common south.

Gnophria quadra. One specimen was taken at Little Eaton many years ago, by Mr. J. Eaton.

Deiopeia pulchella. Said to have once occurred at Repton (Entom. xvii. 141).

Euchelia jacobææ. Recorded once (Rev. Fuller).

Nemeophila plantaginis. Common in the central portions of the county.

Arctia caia. Common.

Spilosoma fuliginosa. Common everywhere. — *S. mendica*. Once in

Middleton Dale (Rev. C. F. Thornewill). — *S. lubricipeda.* Common. —*S. menthastri.* Common.

Hepialus humuli. Common. — *H. sylvanus.* Fairly common south, rarer north. — *H. velleda.* Common. — *H. lupulinus.* Common everywhere. — *H. hectus.* Common.

Cossus ligniperda. Common.

Zeuzera pyrina, L., *æsculi*, L. Frequent south.

Porthesia similis, Fues.,=*auriflua*, Fb. Common south.

Leucoma salicis. Findern.

Dasychira pudibunda. Findern (Rev. G. A. Smallwood).

Orgyia antiqua. Common everywhere in the county.

Trichiura cratægi. Not common. Willington.

Pœcilocampa populi. Repton.

Eriogaster lanestris. Willington and Chellaston.

Bombyx rubi. Dovedale (E. Brown). Plentiful in Dovedale (J. T. Harris). Reported from the moors (Rev. R. H. Fuller). — *B. quercus.* Fairly common. Chellaston and Little Eaton.

Odonestis potatoria. Common.

Saturnia pavonia, L.,=*carpini*, Schiff. Recorded by Mr. Hill.

Drepana lacertinaria, L.,=*lacertula*, Schiff. Recorded by Rev. G. A. Smallwood. — *D. falcataria*, L.,=*falcula*, Schiff. Seal Wood.

Cilix glaucata, Scop.,=*spinula*, Schiff. Common throughout the county.

Dicranura bicuspis. Rare. Egginton (E. Brown). — *D. furcula.* Repton and Barrow. — *D. bifida.* Fairly common in south-west. — *D. vinula.* Common south; unrecorded from Bakewell district but common about Staveley.

Pterostoma palpina. Seal Wood, Barrow, and Repton Shrubs.

Lophopteryx camelina. Common.

Notodonta dictæa. Common everywhere. — *N. dictæoides.* Derby and Breadsall. — *N. dromedarius.* Derby and Repton Shrubs. — *N. ziczac.* Seal Wood, Repton, Derby, and Barrow. — *N. chaonia.* Repton Shrubs (G. Baker). — *N. dodonea.* Seal Wood (E. Brown). Repton Shrubs (G. Baker).

Phalera bucephala. Common in the south.

Thyatira derasa. Fairly common south. — *T. batis.* Fairly frequent everywhere.

Asphalia diluta. Ingleby. — *A. flavicornis.* Moderately common everywhere.

(To be continued.)

NOTES AND OBSERVATIONS.

Jumping Beans and Jumping Eggs.—There is a remarkable analogy between the "Jumping Beans" which have suddenly sprung into notoriety, and the "Jumping Eggs" of Table Mountain, Cape Town. The latter curiously-animated objects are the production of an insect, and the saltatory action is similarly produced by the activity of the enclosed embryo. These eggs are perfectly oval, white, and about the size of a small sugar-plum, or the printed o's in "Our Notebook," which heads the first column of 'South Africa.' The shell, or case, though only membranous, is hard enough to rattle when confined in some small box. Some of the eggs given to me in Cape Town had been procured the previous day by a young gentleman, who assured me that they kept up such a racket in a match-box in which he had placed them, that they disturbed his rest, and he got up in the night to remove them to a drawer at the farthest end of his room. It was the strangest sight to watch these tiny eggs rolling and springing or standing on end, and leaping like pith-balls on an electrifying machine. Almost a foot they sometimes jumped, either in height or in distance, and by chance beyond the edge of the table, when they fell to the floor, keeping me busy in picking them up again. It was mail day, and I was deep in my weekly despatches; so at last I allowed one of them to remain on the carpet and jump *ad libitum*, while I consigned the others to their box and resumed my pen. Very soon, however, on glancing down, the miniature egglet--my new and precious curiosity—was not to be seen. At once, yet with the utmost caution, I was on hands and knees searching the carpet long and patiently; and it must have been nearly an hour before I discovered the wandering mite at the farther end of the room. But alas for my despatches, it was then too late to mail them. Fancy having one's entire morning consumed, and business frustrated, by the irrepressible egg of an insect! These eggs are ignorantly supposed to be seeds "growing" on a bush. On a bush it is true they are found, and not infrequently, but enclosed in a sort of tumour, like the oak-gall. The parent insect deposits a single egg in a leaf, where as it grows it produces the swelling. It is only when detached from the bush that the embryo becomes excited and keeps up a perpetual motion, as if it were bewitched. The first I saw were exhibited at one of the meetings of the South African Philosophical Society, by Roland Trimen, Esq., F.L.S., F.E.S., and the author of that splendid work on the 'South African Butterflies.' Mr. Trimen had carefully studied the eggs for several years in succession, but had never succeeded in hatching them. The branches wither and die before the eggs are hatched. But he has examined the larva, which he considers more nearly resembles that of a coleopterous insect than any other. It must be a very large beetle to produce such an egg. The "jumping," he thinks, is produced by an action similar to that of the cheese-maggot, which, by the peculiar flip or catch of head and tail, launches itself a distance of many inches. The shrub on which these very remarkable eggs are deposited is the Taai bush—tough bush, from its unbreakable stems. Mr. Trimen signified his intention of having an entire Taai bush dug up and planted in the Museum Garden, that he might watch the hatching of those provoking little eggs. He does not intend that science is to be baffled by a beetle. When I learn the result of his investigations I shall hope to report it in 'South Africa.'--Catherine C. Hopley; 42, Haggard Road, Twickenham.

[The above was originally published as a letter to the Editor in 'South Africa,' Dec. 1st, 1894. We are sure that many of our readers would be interested to learn the result of Mr. Trimen's investigations, and hope that Miss Hopley will favour us with any further particulars she may obtain.--Ed. Entom.]

INSECTS AND THE FERTILISATION OF MEDICAGO.—In a paper entitled "On the Fertilisation of some species of *Medicago*, L., in England" ('Proceedings of the Cambridge Philosophical Society,' vol. viii. pt. iii.) Mr. I. H. Burkill discusses the action of certain insects on the explosive mechanism of the *Medicago* flower and their influence in the work of fertilisation. Lists are given of the various species of insects observed to visit the flowers, and a comparison is made between these and the lists given by Müller, the conclusion drawn therefrom being that "it appears *not unlikely*, as might be expected, that flies take in England the place which other more specialised insects occupy in Germany."

THE COLD AUTUMN OF 1894 AND ITS EFFECTS ON CERTAIN SPECIES OF THE GENUS VANESSA.—Of *V. urticæ* I picked about fifty larvæ, nearly full-grown, off nettles, on Aug. 29th, near Chester, a second brood, no doubt. From Oct. 2nd to 19th twenty-five imagines emerged from the chrysalids; the remainder, with the exception of one, died from the effects of the cold weather. The sombre but interesting pattern on the under side of the wings was a little brighter in some specimens, but all were rather small and dark on the whole; otherwise there was no variation of importance. The survivor emerged on Nov. 4th. The species was fairly common throughout the summer. Of *V. io* I saw about two dozen larvæ, more than half-grown, on Sept. 1st, on nettles, near Chester. On my next visit they had disappeared, except a few shrivelled and dead examples. I saw no imagines throughout the season. *V. atalanta* larvæ and pupæ were abundant on nettles near Chester on Sept. 1st. The pupæ had two, sometimes three, leaves drawn together in the form of a hollow ball, a pupa in each, suspended from the top. None observed in any other position upon the nettles, and one only on the wooden railings close to the nettles. Many of the caterpillars were black, with pale yellowish crescentic marks on each side. I took about a hundred larvæ and pupæ. Some of the larvæ had hung themselves up in preparation for the chrysalis state. First emergence on Sept. 30th; the rest began to die off on Oct. 19th; like *V. urticæ* they were only able to partially escape from the chrysalis, or get clear as cripples. On Oct. 19th I bred forty perfect specimens, all told, chiefly by bringing the survivors indoors. My object in breeding *V. atalanta* was to try and get examples of a form which has been seen in this district, in which the bands are orange-red or pale dull red, instead of the usual scarlet. I only partially succeeded in three specimens, which have pale marginal bands on the lower wings. In one of these the upper outer portions of each right wing are dusted with metallic blue scales. Another has a small black spot in the lower portion of the scarlet band of upper left wing. Only one of the forty specimens had the small white spot which sometimes occurs, irrespective of sex, in a similar position on the scarlet band of each upper wing. Another varietal form I bred has a pale blotch extending across the band in the region of the white spot. It was, however, the under sides that chiefly showed variation. Some are very pale, while others verge on blackness. There is, in some cases, a white blotch or spot on the angular part of the red band. Parenthetically, I wonder how many entomologists have noticed in frequent specimens the figure 3 near the apex of the left wing! On the right wing it becomes a capital E. My experience may be of use in accounting for scarcity of Vanessids last autumn in this and other districts. Individuals fortunate enough to leave the chrysalis would probably seek hybernating quarters at once if they could. It will be interesting to observe their progeny next season from a numerical point of view. In spite of their protection in the larva and pupa state, many of the *V. atalanta* were ichneumoned. The first species of ichneumon, because most abundant, was a midge-like parasite; the second, of which I only discovered one specimen, was a veritable sawfly, the size of a wasp and black, legs black and russet, and with a long lance at the extremity protected by the usual V-shaped sheath.—J. ARKLE; Chester.

CHROSIS BIFASCIANA = AUDOUINANA.—This pretty species seems to be of rare occurrence of late years, at any rate I could only muster three specimens in thirty years, until Burney's sale in January last, when I purchased about thirty-eight specimens, part in the collection and others in duplicate boxes. All of them had evidently been taken at the beginning of the "gilt pin" era, some thirty years ago; the pins were tarnished, and most of the specimens were a little greasy and "verdigrised" about the head and body. Does any one know what the larva feeds on? Stainton says, "amongst oaks."—J. B. HODGKINSON; Ashton-on-Ribble, December, 1894. [This species is said to be not uncommon at Chattenden in Kent.—ED.]

CIDARIA RETICULATA.—This pretty and very local species, which only occurs in the Lake District near Windermere, seems, as far as we can judge, to be on the quick road to extermination. The larva feeds on the seed-pods of the wild balsam (*Impatiens noli-me-tangere*). The little Tortrix larva, *Penthina postremana*, also depends for its existence on the stems of this plant. The balsam grows in abundance, but the first-named insect seems to be exceedingly local. I have only known of three places where I could find any larvæ, and two of them have some time since been destroyed. The third and last place, where the plant was in luxuriant abundance last year, is now practically a barren wilderness. My wife and I paid a visit to the spot on Oct. 1st, but we found to our disappointment nearly all the plants swept away. In order to make clear what seems to me the probable solution of this state of things I must narrate a fact. A certain insect-hunter in the north of England told some collectors that, before any of them should go and look for *reticulata*, he would pull up every plant. He seems indeed to have fulfilled his wanton threat, for my informant, after spending three days in careful search, found only two larvæ on a small plant which had escaped the hand of the destroyer. I wrote to Mr. Moss, of Windermere, who discovered the species independently two years ago. He tells me that he was unable to visit the place this year during the *reticulata* season, as he was staying away in the north of Scotland, and that he is quite at a loss to account for this sad destruction by any natural means. He writes thus:—"It is indeed lamentable if this beautiful moth is to become extinct, and every possible effort ought to be made to obviate such a catastrophe. Not much seems possible, but it is the duty of all alike to do their best to discourage any individual who would not scruple to ruthlessly destroy the food-plant of a local species for the advancement of his own interest. Such a one is not worthy of the name of entomologist." Let us sincerely hope that it is not too late, and that our worst fears may not be realised.—J. B. Hodgkinson.

Food-plant of Bombyx trifolii.—With regard to the food-plant of *Bombyx trifolii* in this district, which at present appears to be its chief habitat, its larva feeds almost exclusively on *Anthyllis vulneraria*, the kidney-vetch; but it will also eat *Lotus corniculatus* in confinement. Hawthorn and sallow I have found very poor substitutes, as they do not seem to afford sufficient nutriment to enable the larvæ to pupate successfully. They like to spin up, just beneath the surface of the sand, and must be kept slightly damp. As noticed by Messrs. Turner and Prideaux (Entom. xxvii. 316; xxviii. 16), the effects of removing them, or leaving them alone, seem almost equally disastrous under certain conditions. I usually obviate this by slicing the end off the cocoon with a sharp knife; great care, however, must be exercised, to avoid injuring the pupa, which is extremely delicate. Both larva and cocoon possess very strong urticating properties, and I know of no species more easily taken in numbers by "assembling."—H. Bickerton Jones; 180, Lodge Lane, Liverpool.

Wood Naphtha as a Relaxing Medium.—As the old-fashioned but still useful laurel-jar and damp-sand methods of relaxing insects have, to a certain extent, given way to the relaxing-tin—with its perforated zinc-bottomed trays lined with thick flannel moistened with water containing a little carbolic acid (Entom. xxv. 119)—so possibly may this latter some day be superseded by a new and better arrangement. Indeed, something in this direction is already before the public. Dr. Knaggs, in the 'Entomologists' Monthly Magazine,' has introduced a process of softening the wings of Lepidoptera, communicated to him by Mr. Clark of Hackney. All that seems to be necessary is to damp the bases of the wings on the under side with wood naphtha (pyroxylic spirit), when, after the spirit has been allowed time—say three or four minutes—to soak into the joints, the wings should be pliable enough to permit of spreading on the setting-board. If, however, they should still be refractory, a further application of naphtha will complete the business. Resetting must be commenced directly the wings begin to soften; and if it is required to alter the position of the antennæ, these may be treated separately and after the wings are fixed. In his account of the *modus operandi*, Dr. Knaggs evidently refers to the treatment of a specimen which had been set. Perhaps in the case of unset or "papered" butterflies it would be permissible to dip the specimens in the naphtha instead of applying the spirit by means of a camel-hair brush; but even if this could be done, and without injury to the insects, the process hardly seems to offer any substantial advantage over the relaxing-tin in dealing with a number of specimens. If, however, we have only a few examples to treat, wood naphtha as a relaxing medium would appear to be handy and useful. —Richard South.

CAPTURES AND FIELD REPORTS.

Variation of Vanessa urticæ in Co. Waterford, Ireland.—I bred several specimens of *V. urticæ* this year, intermediate between var. *connexa*, Butl., and the type. Is this variety rare? And has it been previously noticed in Ireland? I also bred some dwarf examples of the type from half-starved larvæ, one of which measures only 1 in. 3 lin. across the expanded wings. I may remark here that the larvæ of *V. urticæ* were extremely abundant throughout the season in this locality, and possibly more of this variety could have been bred.—L. H. Bonaparte-Wyse; Manor of St. John's, Waterford, Dec. 30th, 1894.

Note on Vanessa c-album. — Hybernated specimens of *V. c-album* were very common near Newport in March and April, 1894.—On June 17th I found four small larvæ feeding on red-currant at Greete, near Tenbury, Shropshire. The first butterfly, which emerged on July 7th, was a female, with pale fulvous under side; and this is the only specimen of the pale variety I have seen this year. On July 14th a male and a female, and on the 20th another female, emerged; these, as well as specimens caught on the wing up to August 6th, had dark under sides. There was nothing particularly noticeable about the autumnal brood, the first specimen of which I saw on September 1st.—W. Edney Cox; Newport, Mon.

Chœrocampa celerio in Lancashire.—I have to report the capture of *Chærocampa celerio*, in fair condition, on Nov. 4th, 1894, at Lancaster, by Mr. John Ralph, a member of the Lancaster Entom. and Nat. Hist. Society, in whose possession the insect is. The insect was captured in a greenhouse at Bath Mill Gardens, and Mr. Ralph had the good fortune to secure one, but very much worn, some twenty years ago, in this locality. —Ed. Willan; 92, Penny Street, Lancaster, Dec. 20th, 1894.

Dragonflies in Surrey.—In the December number of the 'Entomologist' (xxvii. 349) is a very interesting note by Mr. W. J. Lucas of the fifteen species of dragonflies observed by him at the Black Pond, Esher, Surrey. Of these fifteen species three, viz., *Æschna mixta*, *Agrion tenellum*, and *A. pulchellum*, I have hitherto failed to notice at my favourite hunting-ground, the Hut Pond, Wisley, which is only a few miles distant from the Black Pond and in a very similar locality; but probably the last-mentioned species (*pulchellum*) I have overlooked, as I found one which I could not otherwise account for, among some *A. puella* from that pond. Of those species, neither included in my list (E. M. M. vol. xxix. pp. 9 and 141) of the twenty species found at the Hut Pond, nor in Mr. Lucas's record, one, viz., *C. virgo*, I found in abundance at Newark Abbey, Ripley, some two and a half miles from the Hut Pond; so that from this small district of Surrey, not eight miles from point to point, we have now recorded twenty-four species out of our thirty-nine. Can any other district show so rich a record? Of the fifteen other species, six, viz., *L. fulva*, *O. cærulescens*, *S. sanguineum*, *S. flaveolum*, *C. annulatus*, and *L. nympha*, may possibly yet occur in the district; while three, viz., *C. metallica*, *C. arctica*, and *Æ. borealis*, are only to be taken, so far as Great Britain is concerned, in the Highlands; three others, viz., *C. curtisii*, *I. pumilio*, and *E. mercuriale*, are apparently confined to the New Forest, though the last-mentioned has been said to occur both in Cornwall and Scotland, but not recorded; while of the remaining species, one, *Æ. rufescens*, is confined to the Fens; and two, *G.*

vulgatissimus and *L. dubia*, are hardly likely to occur in this district.—C. A. Briggs; Surrey House, Leatherhead, Dec. 17th, 1894.

The Season in North Middlesex.—Compared with my list of observations previously published in this magazine (Entom. xxvii. 146), the record of 1894 is meagre indeed. The magnificent weather in March, closely resembling that of the year preceding, gave promise of a brilliant entomological season; but the miserably cold spell we experienced in May and June, followed by rain in August and fogs in September, effectually disappointed all hope, and species which occurred in some abundance in this district in 1893 have been conspicuous by their absence. I have again to thank Mr. George Wall for a carefully compiled list of his captures at Grim's Dyke. Among them *Asphalia flavicornis*, of those noted by me as new * to the catalogue of Middlesex Lepidoptera collated by Mr. T. D. A. Cockerell (Entom. xxiv. xxv. xxvi.), turns up again, and *Eupithecia pulchellata* with *Hypenodes costæstrigalis* and *Scoparia ambigualis* (quoted somewhat ambiguously, Entom. xxvi. 102) appear to be novelties, so far as the county is concerned. On March 21st *Gonopteryx rhamni* was out, and two days later *V. urticæ*, in very perfect condition, flitted over the sallow bushes on Harrow Weald Common; while I was informed that *P. rapæ* was flying at Eastcote on March 25th. On April 29th *Cænonympha pamphilus*, *Syrichthus malvæ* (swarming in some places), and *Thanaos tages* were common, with (May 7th) *Polyommatus phlæas*. On May 18th I encountered a single perfect female specimen of *Pararge megara*, the first of its kind that I have netted here for the last fifteen years. The same day I saw *Euchloë cardamines* and *Lycæna icarus*, the former very scarce, and then came the bad weather. *Hesperia sylvanus*, on the L. & N.W. Railway bank, was fairly numerous; other butterflies practically disappeared till September, *V. atalanta* (last seen Oct. 13th) was rather more abundant than usual; "the whites" notably rare. In the following list of the Heterocera I have only enumerated, with a few exceptions, those species which were not included in my last year's list. Rhopalocera (19 species): *Pieris brassicæ*, *P. napi*, *P. rapæ*, *Euchloë cardamines*, *Gonopteryx rhamni*, *Argynnis euphrosyne* (noted in error last year as *selene*), *Vanessa urticæ*, *V. io*, *V. atalanta*, *V. cardui*, *Pararge megæra*, *Epinephele ianira*, *E. tithonus*, *Cænonympha pamphilus*, *Polyommatus phlæas* (May 7th to mid-October), *Lycæna icarus*, *Syrichthus malvæ*, *Thanaos tages*, *Hesperia sylvanus*. The occurrence of *A. paphia* on Stanmore Common, noted by Mr. Rhoades Smith (Entom. xxvii. 272), is welcome as supporting my belief that in 1893 I caught a glimpse of the same species hard by; and I think it may be interesting to those who work in Middlesex to know that reports have reached me of *Lycæna corydon* and *Colias hyale* being taken also in 1893, close to the same locality, though at present I have had no opportunity of assuring myself that the specimens are properly identified. Heterocera—inter alia: *Smerinthus populi*, *Macroglossa stellatarum*, *Arctia caia*, *Spilosoma fuliginosa* (May 15th), *Hepialus hectus*, *Cossus ligniperda* (one at sugar, July 9th), *Cilix glaucata* (April 29th), *Notodonta dictæoides* (two, April 25th, on tree trunks), *Asphalia flavicornis*, *Leucania lithargyria*, *Hydræcia micacea*, *Miana fasciuncula*, *Caradrina alsines*, *Tryphæna comes*, *Pachnobia rubricosa*, *Calymnia diffinis*, *Aplecta nebulosa*, *Hadena dentina*, *Zanclognatha grisealis*, *Pechypogon barbalis*, **Hypenodes costæstrigalis* (July 6th), *Phigalia pedaria*, *Nyssia hispidaria* (one female, Feb. 24th), *Acidalia dimidiata*, *A. virgularia*, *Anisopteryx æscularia*, **Eupithecia pulchellata* (July

3rd), *E. nanata*, *E. abbreviata*, *Anticlea badiata*, *Eucosmia undulata*, *Cidaria fulvata*, *C. dotata*, *Scoparia ambigualis*, *Scopula prunalis*, *Ebulea sambucalis*, *Pionea forficalis*, *Cataclysta lemmata*, *Paraponyx stratiotata*, *Pterophorus monodactylus*, *Aciptalia pentadactyla*, *Alucita hexadactyla* (Aug. 30th), *Crambus pratellus*, *C. culmellus*, *C. hortuellus*, *Ephestia kühniella*. The above are nearly all from Mr. Wall's list. I have included several very common species only because they do not appear in my former notes. *Cheimatobia brumata* is unpleasantly in evidence, the water at Grim's Dyke being literally strewn with the bodies of the males at the time of writing, while in the spring this veritable pest remained with us, the males as late as Feb. 16th, the females Feb. 2nd. Of the absentees—and they are many—*Brephos parthenias*, *Tephrosia biundularia*, and *Cidaria populata*, are the most to be regretted, as their claim to the Middlesex records appears to rest solely on our observations of single specimens in 1893. —H. Rowland-Brown; Oxhey Grove, Harrow Weald, Dec. 16th, 1894.

Notes from Paignton, S. Devon.—A friend and I collect occasionally, mostly as a pleasurable recreation and healthy exercise, in this locality, which, however, is not a very good one, and has been less productive than ever during the past season—a season of rain. Our chief hunting-ground is a small wood and adjoining orchard, situated near the sea. Sallows, in the spring, were only productive on one night, as the bushes are in a very wind-swept situation, and, during the whole period they were in blossom, a bitter north-east wind prevailed, which, with frost, sometimes completely spoiled sport, with the exception mentioned. On that night, from among the multitude of common insects present, we took examples of *Tæniocampa munda*, *T. rubricosa*, *Xylocampa lithorhiza*, &c., and one each of *Oporina croceago* and *Dasycampa rubiginea*, not, however, in the very best condition. *Lycæna argiolus* was abundant in my garden early in the season, and appeared again in August. A moth-trap, also in my garden, produced many common species, including some large *Odontopera bidentata*; also *Pericallia syringaria*, *Numeria pulveraria* (both uncommon here), *Rusina tenebrosa*, *Grammesia trilinea*, *Heliophobus hispidus*, *Noctua festiva*, and others. Sugaring has been very variable, the nights apparently most suitable sometimes being blanks, and the result on the whole not nearly so good as last year. Early in the season *Grammesia trilinea* came in any number; in fact, hardly any other species was to be seen. This is remarkable, as in previous years we have never seen this insect here. Later on, *Agrotis puta* and *Cosmia affinis* were plentiful. *Calligenia miniata*, several by beating, also on the wing at dusk and on the sugar. *Corycia taminata* scarce this year, though it always occurs in the wood; the same applies to *C. temerata*. *Fidonia piniaria*, *Venilia maculata*, and *Angerona prunaria*, plentiful on the wing at dusk. *Heliophobus hispidus* came freely to the sugaring lamp on the higher ground. *Gonophora derasa* we found this year at sugar, though it is not a common species here. *Thyatira batis* we have not seen for two years; before then it used to be fairly abundant. *Acronycta ligustri* was very scarce; we saw one on sugar, but it got lost in the grass. Subsequently I caught another at in-door light, but it was damaged. *Liparis monacha* round sugaring lamp, and off street lamp coming home, where we also took *Ennomos fuscantaria*, *Hydræcia micacea*, and *Himera pennaria* on Nov. 17th—the same species, too, in moth-trap. On the 27th Sept., a cold night, with strong easterly wind (altogether "unlikely" conditions), we tried sugar, and took several *Polia flavicincta* (particularly off thistles), *Agrotis saucia* and *A. suffusa*, and one *Epunda nigra*. *Phlogophora meticulosa* was so numerous on this occasion as to be a regular nuisance. Hoping to meet with *E. nigra* again, we tried next night, but never took a single specimen of any kind. However, the second week in October being remarkably fine, we determined to try again, and had no cause to regret it. The experiment proved a record night; all the common ivy frequenters swarmed at the patches—*Miselia oxyacanthæ*, *Anchocelis pistacina*, *A. rufina*, *Xanthia ferruginea*, *P. meticulosa*, *A. segetum*, *Scopelosoma satellitia*, *Orthosia macilenta*, *O. lota*, and others. *Epunda nigra* was most abundant, and we took nearly forty specimens of it that night in two short rounds. Ivy blossom has been almost a failure, owing, I suppose, to a fearfully wet autumn. *Cidaria psittacata* here and there, but not numerous. I have taken the pupæ of this species at the roots of oaks on this coast. We obtained one pretty insect, of a delicate cream-colour, which I have subsequently been told is *A. pistacina*. Plenty more *E. nigra* could have been captured at ivy, but only in that district near the wood; in no other part of the surrounding country did we see it. A month's almost continual rain then prevented further collecting. Last year *Ephyra orbicularia* occurred in some numbers at Tiverton (Devon). This year my friend has received, from a friend in that town, both *Macaria alternata* and *Eurymene dolobraria*; it is a much better locality than this. The extraordinary abundance of *Amphipyra pyramidea* last year, and its comparative scarcity in former years, is noteworthy. *Triphæna ianthina* has hardly been seen here this season, though generally very common indeed. I caught a pretty *Rumia cratægata*, with a broad brown band along the costal margin instead of the ordinary spots. It may be mentioned that the blooms of *Aralia sieboldii* are as attractive as ivy.—C. M. Mayor; Paignton, Devon, Nov. 1894.

Collecting in Gloucestershire.—The following is a list of Lepidoptera which I have taken in this neighbourhood during 1894. The season has been very disappointing, and seems to have ended little or no better than it began. On the 16th of March, a warm sunny day, I saw a lovely *Grapta c-album*, but failed to catch it, as I had not my net with me. A very fine specimen of *Amphidasys prodromaria* was found at rest on a beech-trunk in the woods; evidently it had just emerged from pupa about a couple of hours before. *Tephrosia crepuscularia* and *T. consonaria* were both common on the tree-trunks, and *Epione advenaria*, *Venilia maculata*, and *Drepana unguicula* were roused up out of the bramble in the same woods. In 1893 I took thirty-five *Demas coryli* in one day, at rest, and in less than a fortnight over fifty; this last year not one was taken, though the woods were thoroughly searched by several people day after day. Amongst other things *Argynnis euphrosyne*, *Thecla rubi*, *Polyommatus adonis*, *P. argiolus*, *Thymele tages*, *Phytometra ænea*, *Eupithecia abbreviata*, and *E. coronata* were taken abundantly. *Melitæa artemis*, *Arge galatea*, *Sesia bombyliformis*, *Anthrocera trifolii* (one perfectly red variety), *Procris statices*, *Drepana hamula*, *Emmelesia albulata*, and *Botys fuscalis*, were all taken in a low watery meadow in the daytime. A day's excursion to the Forest of Dean in May only produced *Polyommatus argiolus*, *Argynnis euphrosyne*, *Melanippe tristata*, *Corycia punctata*, a peculiarly dark variety of *Eubolia plumbaria*, and a few other commoner things, including a number of larvæ from oak. Of *Procris geryon*, usually so plentiful here, a single specimen was found after a long search on the hill-side. *Asthena blomeri* continued in good condition in the beech woods, from the beginning of June to end of July; and *Abraxas ulmata* swarmed by hundreds in the same place. Sugar produced practically nothing the whole summer through except *Grammesia trilinea*, which has not occurred here before. A few *Minoa euphorbiata* were knocked up out of the undergrowth in the woods. *Polyommatus adonis* was taken on May 16th, on the hills, and *Nemeophila plantaginis* was flying briskly in the sunshine over the rough ground. Several *Toxocampa pastinum* were attracted by a light held opposite a quarry, and others were netted flying in the long grass in company with *Rusina tenebrosa*, *Phibalapteryx tersata*, *P. vitalbata*, and *Cidaria pyraliata*. On July 27th I unexpectedly roused two *Boarmia abietaria* from the firs; they were rather worn, and easily caught. At Oakley Wood, Cirencester, on Aug. 7th, a perfect *Geometra papilionaria* was captured by accidentally thrusting the net into some nut bushes, where it must have been hanging to the leaves. Some rather worn *Argynnis paphia* and *A. adippe* were netted, and *Drepana unguicula*, *Strenia clathrata*, and *Asthena blomeri* were beaten from the bushes. At light, for which I simply have a very strong lamp at a window overlooking the garden to serve as a moth-trap, very few things were taken until August, when *Heliophobus popularis* and *Luperina testacea* came in hundreds for about a fortnight, and a few *L. cespitis* were intermixed with them. *Cilix spinula*, *Ennomos canaria*, *E. angularia*, *Crocallis elinguaria*, *Phibalapteryx vitalbata*, *Anchocelis lunosa*, and others were also taken. In November a few *Petasia cassinea* were attracted, and later on, *Pœcilocampa populi*; but after taking five of the latter one warm night, no more were even seen. Ivy bloom has not been at all productive here. Last year almost every head had some welcome visitor. This autumn nothing turned up of note; indeed, one *Xanthia gilvago* and two or three *Cerastis spadicea* were the only insects taken.—C. J. NASH; Standish Vicarage, Stonehouse, Gloucestershire.

INSECTS AT LIGHT DURING 1894.—Bearing in mind the popularity with which my previous record of "Insects at Light" was fortunate enough to meet, I have again drawn up a list of the season's captures by that method, and am pleased to find the number of Lepidoptera exceeds that of last year by, roughly, fifty or sixty species, which appears as though this were not so inferior a season for entomologists as the majority of correspondents would have us believe; some of these, however, are Micros. As before, I will give two lists, that the respective merits and demerits of lamps and electric light may be fully appreciated, bearing in mind, however, that the latter is situated in the centre of the town, and the other light records are chiefly street-lamps in the outlying districts, though some are at indoor light, and others at lamps in woods. Ipswich is situated on the banks of the Orwell, and so low in a valley, with hills on every side, excepting where the river winds through water-meadows to Stowmarket, that the electric light may be seen on a dark night from these hills, often two, and, sometimes, a white glare in the sky three miles out. How far it is capable of exercising its fatal attraction, of course, I do not know, but, from the almost invariably bad condition of the moths when they do at last reach the light, I think a considerable distance. At electric light I have personally seen or taken the following species this year:—*Sphinx ligustri*, *Smerinthus populi*, *Lithosia lurideola*, *Arctia caia*, *Spilosoma lubricipeda*, *S. menthastri*, *Porthesia similis*, *Bombyx neustria*, *Rumia luteolata*, *Epione apiciaria*, *Selenia bilunaria* and var. *juliaria*, *Odontopera bidentata*, *Cro-*

callis elinguaria, *Ennomos alniaria*, *E. fuscantaria*, *Himera pennaria*, *Nyssia hispidaria*, *Biston hirtaria*, *Amphidasys strataria*, *A. betularia* and var. *doubledayaria*, *Hemerophila abruptaria*, *Boarmia gemmaria*, *Pseudopterpna pruinata*, *Ephyra annulata*, *Acidalia aversata*, *Timandra amataria*, *Halia vauaria*, *Strenia clathrata*, *Abraxas grossulariata*, *Ligdia adustata*, *Hybernia marginaria*, *H. aurantiaria*, *Anisopteryx æscularia*, *Cheimatobia brumata*, *Eupithecia oblongata*, *E. vulgata*, *E. absinthiata*, *E. rectangulata*, *Hypsipetes sordidata*, *Melanippe fluctuata*, *Coremia ferrugata*, *C. unidentaria*, *Phibalapteryx tersata*, *Cidaria immanata*, *C. associata*, *Pelurga comitata*, *Drepana falcataria*, *D. binaria* (seen), *Cilix glaucata*, *Dicranura bifida*, *D. vinula*, *Phalera bucephala*, *Pygæra curtula*, *Lophopteryx camelina*, *Notodonta dictæa*, *N. ziczac*, *N. chaonia* (one specimen on April 11th and another about May 20th), *Bryophila perla*, *Acronycta psi*, *A. megacephala*, *A. rumicis*, *Hydrœcia nictitans*, *H. micacea*, *Axylia putris*, *Xylophasia monoglypha*, *Charæas graminis* (two females), *Luperina testacea*, *Mamestra sordida*, *M. brassicæ*, *M. persicariæ* (which swarmed), *Apamea basilinea*, *Miana strigilis*, *Grammesia trigrammica*, *Caradrina morpheus*, *C. alsines*, *C. quadripunctata*, *Rusina tenebrosa* (seen), *Agrotis puta*, *A. segetum*, *A. exclamationis*, *A. corticea*, *A. nigricans*, *A. tritici*, *A. aquilina*, *Triphæna ianthina*, *T. comes*, *Noctua augur*, *N. plecta*, *N. c-nigrum* (not nearly so abundant as last year, though still common), *N. brunnea*, *N. festiva*, *N. rubi* (both first and second broods), *N. umbrosa*, *Tæniocampa gothica*, *T. incerta*, *T. stabilis*, *T. pulverulenta*, *Pachnobia rubricosa*, *Anchocelis lunosa*, *A. litura*, *Cirrhœdia xerampelina* (one specimen on Sept. 19th), *Dianthœcia capsincola*, *Polia flavicincta* (seen), *Phlogophora meticulosa*, *Euplexia lucipara*, *Hadena trifolii* (abundant), *H. oleracea*, *H. pisi*, *Plusia chrysitis*, *P. gamma*, *Catocala nupta*, *Hypena rostralis*, *Pyralis costalis* (in 1893), *P. farinalis*, *P. glaucinalis* (commonly), *Cataclysta lemnata*, *Paraponyx stratiotalis* (commonly), *Botys ruralis*, *B. urticata*, *Pionea forficalis*, *Endotricha flammealis*, *Phibalocera quercana*, *Œdematophorus lithodactylus*, *Pterophorus monodactylus*, *Alucita hexadactyla*. Several other orders of insects also show a great penchant for the luminary, as the following notes at electric light illustrate. Coleoptera :—*Pterostichus madidus*, *Harpalus proteus*, *H. picipennis* (several of each); *Colymbetes fuscus*, *Agabus striolatus*, *Dytiscus marginalis* (female, one), *Coccinella bipunctata*, *Aphodius rufipes*, *Melolontha vulgaris*, *Rhizotrogus solstitialis*, *Serica brunnea*. Hymenoptera:—*Lasius niger*, *Ophion luteum*, *O. obscurum* (fairly commonly), together with a few *Athalia rosæ*. Orthoptera was represented by *Periplaneta orientalis*, and Neuroptera by (probably) several species of the Hemerobiidæ. From lamps, both gas and oil, I took *Nola cucullatella* (six in half-an-hour), *Lithosia lurideola*, *Spilosoma lubricipeda*, *S. menthastri*, *Porthesia similis*, *Pœcilocampa populi* (Nov. 5th), *Rumia luteolata*, *Selenia bilunaria*, *Odontopera bidentata*, *Crocallis elinguaria*, *Ennomos alniaria*, *Himera pennaria*, *Hemerophila abruptaria*, *Boarmia gemmaria*, *Acidalia virgularia*, *A. aversata*, *Timandra amataria*, *Halia vauaria*, *Strenia clathrata*, *Abraxas grossulariata*, *Lomaspilis marginata*, *Hybernia rupicapraria*, *H. aurantiaria* (Nov. 6th), *H. marginaria*, *H. defoliaria*, *Anisopteryx æscularia*, *Cheimatobia brumata*, *Oporabia dilutata*, *Emmelesia affinitata*, *Eupithecia oblongata*, *E. succenturiata*, *E. subfulvata*, *E. pimpinellata*(?), *E. vulgata*, *E. absinthiata*, *E. sobrinata*(?), *E. rectangulata*, *Melanippe sociata*, *M. fluctuata*, *Coremia ferrugata*, *C. unidentaria*, *Triphosa dubitata* (hybernated), *Cidaria miata*, *C. truncata*, *C. suffumata*, *C. associata*, *Eubolia cervinaria*, *Anaitis plagiata*, *Chesias spartiata*, *Cilix glaucata*, *Dicranura bifida*, *Phalera bucephala*, *Diloba cæruleocephala*, *Bryophila perla*, *Leucania pallens*, *Hydrœcia nictitans*, *H. micacea*, *Xylophasia monoglypha*, *Luperina testacea*, *L. cespitis* (seen), *Mamestra brassicæ*, *Caradrina morpheus*, *C. alsines*, *C. quadripunctata*, *Rusina tenebrosa* (commonly in woods), *Agrotis puta*, *A. segetum*, *A. exclamationis*, *Triphæna comes*, *Noctua c-nigrum*, *N. festiva*, *N. rubi*, *Tæniocampa gothica*, *T. incerta*, *T. gracilis*, *T. munda*, *T. pulverulenta*, *Orthosia lota*, *Anchocelis pistacina*, *A. lunosa*, *A. litura*, *Scopelosoma satellitia*, *Xanthia fulvago*, *Hadena trifolii*, *H. oleracea*, *H. pisi*, *Xylocampa areola*, *Plusia gamma*, *Amphipyra tragopogonis*, *Mania typica*, *M. maura* (? at light), *Catocala nupta*, *Herminia tarsipennalis*, *Pyralis glaucinalis*, *Herbula cespitalis*, *Pionea forficalis*, *Crambus perlellus*, *C. tristellus*, *Aphomia sociella*, *Tortrix heparana*, *T. corylana*, *Pterophorus monodactylus*, *Leioptilus microdactylus* (?), *Alucita hexadactyla*. Coleoptera:—*Broscus cephalotes* (? at light), *Calathus cisteloides*, *Harpalus ruficornis*, *H. proteus*, *Coccinella bipunctata*, *Aphodius rufipes*, *Serica brunnea*. Hymenoptera:—Many dead *Vespa vulgaris*,—which had probably entered the lamps in order to prey upon the scorched insects already there, and had consequently *not* been attracted by light,—and several *Ophion obscurum*. Various Hemerobiidæ and Trichoptera turned up. Among the *débris* of thousands of *Chironomidæ* and *Calliphoræ* I noted *Syrphus ribesii*, *Eristalis pertinax*, and several *Homalomyia scalaris* in the autumn. Other records are:—One *Eurymene dolobraria*, which I have never seen about here, was taken at electric light. About a dozen *Smerinthus ocellatus* were taken at ditto in the beginning of June. Two nice specimens of *Pericallia syringaria* were secured at light, whilst sugaring on the 31st of June. *Hybernia defoliaria* has been taken from a street-lamp this year, but is considered by no means common hereabouts. *Pterostoma palpina* at electric light this year, and *Zeuzera pyrina* at a lamp in 1893.—Claude Morley; London Road, Ipswich, Nov. 7th, 1894.

SOCIETIES.

Entomological Society of London.—*December 5th*, 1894. Henry John Elwes, Esq., F.L.S., F.Z.S., President, in the chair. Mr. E. Augustus Bowles, M.A., of Myddelton House, Waltham Cross, Herts; Mr. E. C. Cotes, of the Indian Museum, Calcutta; Mr. Wolley-Dod, of Calgary, Alberta, Canada; Mr. Joseph W. Green, of West Lodge, Blackheath, S.E.; Mr. Henry Keeble, of 10, Coleman Street, E.C.; and Mr. Thomas Turner, of Cullompton, Devon, were elected Fellows of the Society. Mr. F. Merrifield exhibited hybrids belonging to the genus *Saturnia*, obtained by Dr. Standfuss, of Zürich, *viz.*, a male and female hybrid from a male of *S. pavonia* and a female of *S. pyri*, to which he had given the name of *S. emiliæ*; also hybrids from what Dr. Standfuss described as "a male of *Callimorpha dominula* var. *persona*" (received from Tuscany) and a typical female of *C. dominula*, to which he had given the name of *C. romanovi*. Mr. Merrifield remarked that the so-called var. *persona* differed entirely from the type of *C. dominula*. Mr. J. W. Tutt exhibited and read notes on specimens of a very small form of *Euchloë*, taken in Shropshire by the Rev. F. B. Newnham, who was of opinion that it was distinct from

E. cardamines. He pointed out that it was much smaller than the latter species, and that the discoidal spot was placed, as in *E. turritis* and *E. gruneri*, at the juncture of the orange and white spaces, and not, as in *E. cardamines*, well within the orange tip. Mr. Tutt also exhibited and read notes on specimens of *Noctua dahlii*, from Cheshire, Essex, Yorkshire, Aberdeenshire, and other counties. The variation in the specimens was said to be partly due to sexual dimorphism, and partly to their geographical distribution. Herr Jacoby read a letter received from Mr. Buxton Forman, one of the Assistant Secretaries of the Post Office, to the effect that the Postal Union had decided to make a rule not to allow natural history specimens to be sent by sample post, which was intended for the transmission of *bona fide* trade patterns or samples of merchandise, and consequently that the forwarding of such specimens at the sample rate would in future be irregular. Lord Walsingham stated that he had had a long correspondence with the Post Office authorities on the subject, and that the late Mr. Raikes, when Postmaster-General, promised him in 1891 that such specimens should, so far as the British Post Office was concerned, be transmitted at the sample rates; and a letter to the same effect, from the late Sir Arthur Blackwood, when Secretary of the Post Office, was published in the Proceedings of the Society for 1891. Mr. C. G. Barrett exhibited, for Mr. A. J. Hodges, a specimen of *Hydrilla palustris*, from Wicken Fen; also specimens of *Caradrina ambigua*, from the Isle of Wight. He remarked that of the latter, one specimen has the hind margin of the right fore wing indented, and the wing broadened as though from an injury to the pupa. In this wing the margins of the large orbicular and reniform stigmata had become so joined that the dividing lines had disappeared, and the stigmata were fused into one irregularly-formed blotch. Mr. McLachlan exhibited, on behalf of Mr. G. F. Wilson, F.R.S., of Weybridge, a "grease-band" which had been tied round trees to prevent the females of *Cheimatobia brumata* from ascending the trunks for the purpose of oviposition; the band was thickly covered with the bodies of the females, together with a few males. Surgeon-Captain Manders exhibited a pair of *Chelura bifasciata*, from the Shan States, and called attention to the "assembling" habits of the male, some hundreds of which were attracted by the numerous females which emerged from the cocoons at sunset. Mr. B. A. Bower exhibited a beautiful variety of *Zygæna loniceræ*, Esp., having the spots confluent, taken at Chattenden Wood, North Kent, in June last; also a specimen of *Incurvaria tenuicornis*, Stn., taken at Chislehurst, in May, 1893. Mr. H. Goss exhibited, for Mr. F. W. Urich, of Trinidad, a series of males, females, and workers of *Sericomyrmex opacus*, Mayr, a species of fungus-growing and fungus-eating ant. Colonel Swinhoe read a paper entitled "A List of the Lepidoptera of the Khasia Hills, Part III." Mr. C. J. Gahan read a paper entitled "On the Longicorn Coleoptera of the West India Islands." Mr. F. W. Urich communicated a paper entitled "Notes on the fungus-growing and eating habit of *Sericomyrmex opacus*, Mayr." Prof. E. B. Poulton read a paper, by Prof. E. B. Titchener, entitled "An apparent case of Sexual Preference in a male Insect." The Rev. H. S. Gorham communicated a paper entitled "Notes on Herr A. Kuwert's 'Revision der Cleriden-gattung *Omadius*, Lap.'"

January 16th, 1895.—*Sixty-second Annual Meeting.*—Henry John Elwes, Esq., F.L.S., President, in the chair. An abstract of the Treasurer's accounts, showing a good balance in the Society's favour, having been read by Mr. W. F. H. Blandford, one of the Auditors, Mr. H. Goss read the Report of the Council. It was then announced that the following gentlemen had been elected as Officers and Council for 1895:—President, Professor Raphael Meldola, F.R.S.; Treasurer, Mr. Robert McLachlan, F.R.S.; Secretaries, Mr. Herbert Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S.; Librarian, Mr. George C. Champion, F.Z.S.; and as other Members of the Council, Mr. George T. Bethune-Baker, F.L.S.; Mr. Walter F. H. Blandford, M.A., F.Z.S.; Dr. Frederick A. Dixey, M.A.; Mr. Henry J. Elwes, F.L.S.; Mr. Charles J. Gahan, M.A.; Professor Edward B. Poulton, M.A., F.R.S.; Dr. David Sharp, M.A., F.R.S.; and the Right Hon. Lord Walsingham, LL.D., F.R.S. It was also announced that Professor Meldola, the new President, would appoint Lord Walsingham, Mr. Henry J. Elwes, and Professor Edward B. Poulton, Vice-Presidents for the Session 1895-6. The outgoing President then delivered an interesting address "On the Geographical Distribution of Insects." He remarked that though a great deal had been written of late years on the geographical distribution of plants, mammals, birds, fishes, and reptiles, comparatively little had yet been done by entomologists to show how far the natural divisions of the earth's surface which have been established for other classes were applicable to insects. Perhaps the proportion of known as compared with unknown insects was still too small, and the classification of the known species still too uncertain, to allow anything like the same methods to be applied to insects that had been used for mammals by Dr. Wallace, for birds by Dr. Sclater and Dr. Bowdler-Sharpe, and for plants by Sir Joseph Hooker, Mr. Thistleton Dyer, and Mr. W. B. Hemsley. The President enumerated the genera of the Rhopalocera, and pointed out which of them were characteristic of the various regions and sub-regions into which the world had been divided by the zoologists and botanists above-mentioned. He also exhibited specimens typical of these regions and sub-regions. The President then alluded to the prosperous condition of the Society, and to the increase in its numbers and income. Reference was also made to various Fellows of the Society and other entomologists who had died during the year, special mention being made of Herr H. T. Christoph, Mr. J. Jenner Weir, Dr. F. Buchanan White, Mons. Lucien F. Lethierry, Pastor Wallengren, Dr. Jacob Spånberg, Major-General Carden, Dr. Hearder, and Mr. Wellman. A vote of thanks to the President and other Officers of the Society having been passed, Mr. Elwes, Mr. McLachlan, Mr. H. Goss, and Canon Fowler replied, and the proceedings terminated.—H. Goss & W. W. Fowler, *Hon. Secretaries.*

South London Entomological and Natural History Society.—*November 22nd*, 1894.—Mr. E. Step, President, in the chair. Mr. Barrett exhibited, on behalf of Mr. Sydney Webb, a grand series of varieties of *Arctia villica*, L., from one with very few black markings to one almost wholly suffused with black; also, on behalf of Major Still, specimens taken on Dartmoor this year, to show the apparent influence of the extreme humidity in that district, among them being a black example of *Plusia gamma*, L.; a deep-toned *Cidaria siderata*, Hufn., with a green marginal border on the hind wing; a much-suffused black form of *Polyommatus phlæas*, L.; and dark vars. of *Pararge megæra*, L., and *P. egeria*, L. Mr. R. Adkin, on behalf of Mr. R. E. Dillon, a number of Irish Lepidoptera, including *Tæniocampa gothica*, L., var. *gothicina*, H.-S.; a red var. of *T. gracilis*, Fb.; a dark specimen of *Aplecta nebulosa*, Hufn.; and an almost black *Boarmia repandata*, L. Mr. Tutt, a large number of Rhopalocera captured near Aix-les-Bains on August 22nd, including *Leucophasia sinapis*, L., *Colias edusa*, Fb., *C. hyale*, L., *Satyrus arethusa*, W. V., and vars., *S. briseis*, L., with a very fine var., *Erebia æthiops*, Esp., and several of the genera *Argynnis*, *Lycæna*, and *Melitæa*, and read notes on them; also specimens of *Lycæna ægon*, Schiff., and *L. argus*, L., asking if any one could point out satisfactory differentiating characters. A discussion ensued. Mr. Fremlin, a fine specimen of *Chærocampa celerio*, L., captured at the S. Foreland lighthouse on Aug. 12th, 1894. Mr. Mansbridge, two bred series of *Selenia bilunaria*, Esp., from Horsforth and York, including a few *juliaria*, Haw.; one female had only the central band developed. Mr. Moore, *Pieris daplidice*, L., from Blois. Mr. Tutt read a paper entitled "*Zygæna transalpina*, Esp., and its varieties," and exhibited a large number of specimens, one being set to show the curious tufts of feather scales, said to be scent glands, which exist at the anal cavity. Mr. Adkin read a paper entitled "Reflections upon odd Rambles on the Sussex Downs," and exhibited a number of specimens captured near Eastbourne during his holiday there. A discussion ensued on the various habits Rhopalocera have for effectually concealing themselves. Mr. Tutt referred to *Erebia tyndarus*, Esp., which drops down, falls over sideways, and so wriggles on the cow paths of the High Alps, until it reaches some overhanging tuft of grass under which it rests.

December 13*th.*—Mr. T. W. Hall, F.E.S., Vice-President, in the chair. Mr. Robinson, 54, Boundary Road, N.W., was elected a member. Mr. C. A. Briggs exhibited a much-suffused variety of *Eurrhypara urticata*, L. Mr. Williams, specimens from two long bred series of *Vanessa urticæ*, L., from Leigh. The larvæ were all taken on the same date from one bed of nettles; those of one series were full grown, those of the other small. There was a very distinct and constant racial difference between the two series. Mr. Adkin, many specimens of *Melanippe fluctuata*, L., from various localities, and contributed notes. Mr. W. Mansbridge, a large number of Lepidoptera from the Indian Territory, U.S.A., and read a paper thereon. Mr. W. A. Pearce also exhibited specimens from the States to illustrate Mr. Mansbridge's paper. A discussion ensued upon the migration of *Anosia archippus*, L., and the forms of *Colias eurytheme*, Bdv. Mr. Brooks, of Rotherham, a large number of species from that place, including a long series of *Polia chi*, L., showing almost every conceivable variation, and melanic specimens of *Hybernia defoliaria*, L., *Boarmia repandata*, L., and *Phigalia pedaria*, Fb. Mr. McArthur, specimens of *Coleophora laricella*, Hb., from N. Devon. Mr. Tutt, a large number of *Zygæna medicaginis*, Bdv., from the Alps, and read a paper on that species and its varieties.

January 10*th*, 1895.—Mr. T. W. Hall, Vice-President, in the chair. Mr. Thornhill, Castle Cosy, Ireland, and Mr. Brooks, Grange Hall, Rotherham, were elected members. Mr. C. G. Barrett exhibited a specimen of *Hydrilla palustris*, Hb., from Wicken, and four specimens of *Caradrina ambigua*, Fb., from the Isle of Wight. One of the latter had an indentation in the hind margin of the fore wing, which was perfectly ciliated. The malformation had caused the orbicular and reniform on that side to coalesce. Mr. Tutt stated that the species he had reported as *C. superstes*, Tr., had turned out to be a form of *C. ambigua*, but he was of opinion that some of his Deal captures were *C. superstes*. Mr. W. A. Pearce, a bred specimen of *Acherontia atropos*, L. It was stated that the pupa of this species had no free segments, and was thus unable to work its way through the earth. Mr. Carrington, the sections of wood naturally stained, which had recently been described and figured in 'Science Gossip'; also a series of dendritic crystals on flints from Chatham, Kent, and described their origin and composition. Mr. R. Adkin, bred specimens of *Vanessa urticæ*, L., from, Sutherland, one of which had the central costal and the inner marginal blotch united. Mr. Tutt gave an interesting account of a change in number of spots of a race of *Zygæna trifolii*, Esp., within the last fifteen years. In the discussion which followed, several members gave instances of a small six-spotted *Zygæna* being taken early in June in various localities. Mr. Carrington gave a short summary of the spread and increase of melanism during the last twenty years. Communications were read from Mr. Step, Porscatho, Falmouth, and from Mr. Brooks, Rotherham. Mr. Tutt read a paper on "*Zygæna ochsenheimeri*, Zell., and its varieties," and exhibited a long series in illustration.—H. J. TURNER, *Hon. Rep. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*November* 19*th*, 1894.—Mr. G. T. Bethune-Baker, Vice-President, in the chair. Exhibits:—Mr. P. W. Abbott, *Sesia sphegiformis* from Wyre Forest; also a short series of *Caradrina ambigua*, the insect taken at Freshwater, Isle of Wight, which has been recorded in error as *C. superstes; Hydrilla palustris* from Wicken, and *Leucania albipuncta* from Freshwater. Mr. R. C. Bradley, Diptera as follows:—*Idioptera pulchella*, Mg., from Sutton, with its semi-apterous female; *Limnobia nigropunctata*, Sch., from Sutton and Wyre Forest; and *Trimicra pilipes* from Tring. Mr. C. Rung, *Erebia æthiops* from Witherslack, &c. Mr. A. H. Martineau, a series of the genus *Vespa;* also a specimen of *Crabro quadrimaculatus*, with an unusual amount of yellow on the abdomen, giving it a quite unusual appearance. Mr. C. J. Wainwright, a box of Hymenoptera, including a specimen of *Bombus derhamellus* with no yellow on the front of the thorax, from Sutton. Mr. H. J. Sands, living *Vanessa c-album*, bred two months before from a brood, some of which remain in the pupal stage now.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—*December* 10*th*, 1894.—Mr. S. J. Capper, F.L.S., F.E.S., President, in the chair. Messrs. Harry Jackson, of Bolton, and Rhodes, of Accrington, were elected members of the Society. Mr. Robert Newstead, of the Grosvenor Museum, Chester, gave an almost complete account of the life-history of *Scolytus rugulosus*, Ratz., one of the rarer wood-boring Coleoptera, and gave detailed descriptions of the boring and ova-depositing habits of the insect. The lecture was illustrated by diagrams, specimens, and microscopic preparations, shown with the aid of the oxyhydrogen micro-lantern. Mr. Douglas Walker exhibited specimens of *Scopula decrepitalis* and the rare *Phibalapteryx lapidata*, recently captured by himself in Argyleshire. Mr. Newstead exhibited his new Coccix *Lecanium perforatum*, and other species, through the micro-lantern.—F. N. Pierce, *Hon. Sec.*

Reading Natural History Society.—A specimen exhibition was held, and was well attended, on Thursday evening, Nov. 1st, the specimens, as usual, being largely entomological. Mr. A. Dowsett, F.E.S., President, showed specimens of trap-door spiders and their nests, from Jamaica, and leaf-insects from Tropical America. Local insects taken during the past season were well represented. Mr. W. E. Butler exhibited a nice series of *Bombyx trifolii*, bred by himself, also *Leucoma salicis*, *Sesia ichneumoniformis*, *S. chrysidiformis*, *Bryophila glandifera*, *Aspilates gilvaria*, *Gnophos obscuraria*, *Angerona prunaria*, *Melanargia galatea*, &c.—Fred. W. Leslie, *Hon. Sec.*

RECENT LITERATURE.

Butterflies and Moths (*British*). By W. Furneaux, F.R.G.S., Author of 'The Out-door World, or Young Collector's Handbook.' 8vo, with two Appendices and Index. Pp. 358, 12 Coloured Plates and numerous Illustrations in the text. London: Longmans, Green & Co. 1894.

A great deal of information respecting the structure and life-history of Lepidoptera, together with methods of collecting and management of ova, larvæ, and pupæ, and also of preparing and arranging specimens, is given in the first portion (137 pages). Then follow short accounts of our native Butterflies and Moths, of which all the former are considered, and a selection of the species, representing nearly all the genera, of the latter are referred to. Of the two Appendices, one is styled a "Complete Classified List of British Macro-Lepidoptera"; but it is curious to note, that of the twelve species in this division recorded as British since the publication of the 'Entomologist Synonymic List,' only one is here mentioned. In Appendix II. we have an epitome of work to be done during each month of the year. One or two of the plates are exceedingly good, but the others are too florid. The figures in the text are for the most part well executed.

We are somewhat surprised to find the white spot in the red band on fore wing of *Vanessa atalanta* still referred to as a character of the female. Again, in the remarks on *Ocneria dispar* there is nothing to indicate that the species is not now found in a wild state in this country. Further, *Endromis versicolor* is stated to be "seen occasionally in the birch woods of southern counties," but there is no mention of its occurrence in Scotland! Apart from a few errors such as those adverted to the book seems pretty trustworthy, and may safely be used by any one seeking a popular introduction to the study of our native Lepidoptera.

THE ENTOMOLOGIST

Vol. XXVIII.] MARCH, 1895. [No. 382.

EDITORIAL.

We are very pleased to inform our readers that Mr. F. W. Frohawk, who has done much original work in investigating and writing on the early stages of British Rhopalocera, has been good enough to join the 'Entomologist' Reference Committee.

ON THE CAUSES OF VARIATION AND ABERRATION IN THE IMAGO STAGE OF BUTTERFLIES, WITH SUGGESTIONS ON THE ESTABLISHMENT OF NEW SPECIES.

By Dr. M. Standfuss, Lecturer in both Academies at Zürich. Translated by F. A. Dixey, M.A., M.D., Fellow of Wadham College, Oxford.

[Introductory Note by F. Merrifield, F.E.S.

In October of last year Dr. Standfuss kindly sent me a print of a paper of his containing an account of some extremely interesting results obtained by him from the exposure of Lepidoptera in different stages, and especially in the pupal stage, to extreme temperature. Dr. F. A. Dixey has made a careful translation of it, and this, it having been revised and corrected by the author, with the assistance of his friend Dr. Friedrich Ris, of Rheinau, Ct. Zürich, I have much pleasure in submitting for publication in the 'Entomologist.' By those who have read the papers published by me in the 'Transactions' of the Entomological Society of London for the last few years, it will be recognised that the experiments have in many cases been performed by Dr. Standfuss on the same species as those upon which mine have been tried.

Each of us was quite uninformed, until the conclusion of the experiments, of what the other was doing, and the general correspondence of results, where the subjects were the same and the conditions similar, has therefore the effect of independent confirmatory testimony. Some of Dr. Standfuss's results, however, have been obtained with species which were either not tried by me, or not successfully so; and where the species were the same, it will be found that his observations cover many points to which mine did not extend.

As regards my failure to obtain any results from *P. machaon* and *P. podalirius*, it was probably because I had only the winter pupæ to experiment on; and as regards *V. antiopa*, because the pupæ were not fresh enough.

To suit English readers, the degrees according to Fahrenheit's scale have been appended to those of the Centigrade scale used by the author.

In compliance with a suggestion made to me, I append a statement of the papers, dispersed through several volumes of the Entomological Society's Transactions, describing my experiments, as these, taken together with Dr. Standfuss's very comprehensive paper, and the publications of Dorfmeister, Weismann, W. H. Edwards, and Stange, mentioned in Dr. Standfuss's paper, to which should be added the additional observations described in the English edition of Weismann's 'Studies in the Theory of Descent,' by Prof. Meldola (1882), will, I believe, be found to contain nearly all that has been published on the subject. In connection with the phylogeny of some of the principal subjects of the experiments, *viz.*, the Vanessidæ and the Pierinæ, Dr. Dixey's two papers should be referred to—that "On the Phylogenetic Significance of the Wing-markings in certain Genera of the Nymphalidæ," Feb. 5th, 1890 (Trans. Ent. Soc. Lond. for 1891, p. 89); and that "On the Phylogeny of the Pierinæ, as Illustrated by their Wing-markings and Geographical Distribution," Feb. 7th, 1894 (Trans. Ent. Soc. Lond. for 1894, p. 249).

Dorfmeister's work has not, I believe, been translated into English, but there is a rather full statement of his experiments, with observations upon them, in Prof. Eimer's 'Organic Evolution,' translated by Cunningham (Macmillan, 1890).

PAPERS IN ENTOMOLOGICAL SOCIETY'S TRANSACTIONS.

1887, Dec. 7th (Trans. 1888, p. 123).—*Selenia bilunaria* (*illunaria*); forcing eggs and larvæ, several broods in succession.

1888, Dec. 5th (Trans. 1889, p. 79).—*Selenia bilunaria*, *S. tetralunaria* (*illustraria*), and *Ennomos autumnaria* (*alniaria*); forcing and cooling in different stages.

1889, Dec. 4th (Trans. 1891, p. 131).—*S. bilunaria* and *S. tetralunaria*, and *E. autumnaria;* forcing and cooling in egg, and larval, pupal, and imaginal stages; summary of conclusions, especially as to seasonal double-brooded species.

1890, Dec. 3rd (Trans. 1891, p. 155). — *S. tetralunaria*, *E. autumnaria*, *Vanessa urticæ;* forcing and cooling, and different effects caused by temperature according to period of pupal stage in which applied; negative results from moisture applied in pupal stages of *S. tetralunaria* and *E. autumnaria;* possible use of temperature experiments on pupæ in tracing evolution of markings on wings.

1891, Dec. 2nd (Trans. 1892, p. 33).—*S. lunaria*, *S. bilunaria*, and *S. tetralunaria*, *Platypteryx falcataria*, *Vanessa urticæ*, *Bombyx quercus* and var. *callunæ*, *Chelonia caia;* negative results with spring emergence of *P. machaon* and *P. podalirius*, *Thais polyxena*, and some other species; negative results as to effect of light on pupæ of *S. tetralunaria* and *Bombyx cynthia*.

1892, Dec. 7th (Trans. 1893, p. 55).—*Pieris napi*, *Vanessa atalanta*, *Chrysophanus phlœas*, *Zonosoma* (*Ephyra*) *punctaria*. [1893, Feb. 22nd, Trans. p. 69, observations by Dr. F. A. Dixey on the phylogenetic significance of the variations produced by difference of temperature on *Vanessa atalanta*.]

1894, March 14th (Trans. 1894, p. 425).—*Pieris napi*, *Pararge egeria*, *Cidaria silaceata*, *Arachnia levana*, *Vanessa polychloros*, *V. atalanta*, *V. c-album*, *V. io*, and *V. antiopa*, with observations (p. 439) by Dr. F. A. Dixey, on the results obtained.]

I have already treated of the present subject, though by a different title, in the 'Manual for Collectors of the European Lepidoptera,' 1891, pp. 107–128. My starting-point was there the divergent forms—varieties and aberrations—considered in themselves; but in the course of the examination of these forms the causes were indicated by means of which these divergences may perhaps have arisen. This was the only method at that time open, since but few positive statements could then, unfortunately, be made as to the causes of the phenomena in question. It was almost entirely a case of hypotheses with a greater or less degree of probability.

We will here adopt the converse method; that is to say, we will devote our chief attention to the causes which have brought about these phenomena; for I am now, in consequence of careful investigations extending over many years, in a position to contribute in a more practical manner to the solution of this question.

There are a very large number of external conditions which have a decided influence on the organic world. Among these are—degrees of temperature and of humidity, amount of light, barometric pressure; I might further mention the chemical influence of food-stuffs and possibly electricity. I shall here confine myself in the main to those classes of factors whose operation I have myself tested (these being, it will be understood, but a small fraction of the whole), and in what follows I shall either completely pass over or merely touch upon the remainder, at the same time warmly commending them to the notice of zoologists, and especially of entomologists, for experiment.

Forms diverging from the normal imaginal aspect may be occasioned by the influence of external conditions on the stage of egg, larva, pupa, or imago; that is to say, on the perfect insect itself, or any one or more of the preliminary stages. Of the cases falling under these different categories we shall naturally discuss only those that have been actually examined.

I. THE EGG.

The only experiments I have made on the egg-stage of Lepidoptera—and these are only partial—have been in reference to the effect upon them of a raised temperature. Eggs of *Arctia fasciata*, Esp., *Dasychira abietis*, Schiff., *Lasiocampa pruni*, L., and *L. pini*, L., which were exposed to a temperature of 34° C. (93° F.) during the process of laying by the female and up to the time of hatching, produced the larvæ in two-thirds or less of the normal time, and there emerged as perfect insects in the same year, *i. e.*, without hybernation of the larva, in the case of *fasciata*, 71 per cent.; of *abietis*, 90 per cent.; of *pruni*, 100 per cent.; and of *pini*, 81 per cent. The larvæ and pupæ of the above broods were kept as far as possible at a mean temperature of 25° C. (77° F.).

The eggs of the same females as those used in the above experiment, which had already been laid at a normal temperature (about 22° C., 72° F.), and were left in this until hatched, afterwards remaining as larvæ and pupæ in the same mean temperature of 25° C. (77° F.), produced a considerably smaller number of perfect insects without hybernation of the larvæ, *viz.*, *A. fasciata*, 23 per cent.; *D. abietis*, 12 per cent.; *L. pruni*, 64 per cent.; *L. pini*, 28 per cent.

The prematurely developed moths of both series showed on comparison with each other no differences of importance, with the exception of three females of *A. fasciata*, whose larvæ and pupæ had, however, been subjected to different biological conditions from the rest of the early-developed specimens. The different percentage in the two cases, of individuals showing divergence in biological peculiarities from the rest of the brood of the same parent-moth, must therefore be undoubtedly considered as dependent on the difference of temperature to which the two series used in the experiment were exposed in the egg-stage. The acceleration of development, that is to say, which the larva had already undergone in the egg, seems in these cases to have transferred its energy to the later stages of growth. It is well known (see 'Insekten-Börse,' Leipzig, April 15th, 1894, pp. 81, 82) that with the shortening of the period of development is associated in very many cases an obviously altered aspect of the perfect insect, affecting both size, form, and colouring, as in *Lasiocampa populifolia*, Esp., compared with var. *æstiva*, Stgr., and *L. pruni*, L., with var. *prunoides*, Beck.

According to the experiments now recorded it would seem that this alteration in aspect of the perfect insect, to judge at least by the number of individuals that show it, must be influenced by the temperature to which these individuals have been exposed in the egg-stage; so that, if any one wishes to rear such specimens, he must, if possible, keep even the egg at a raised temperature. A series of interesting observations might undoubtedly be made by taking the opposite course, by lowering the temperature, that is to say, and so keeping back the eggs. Many years ago I made an experiment of this kind with a large number of eggs of the second brood of *L. pruni*, unfortunately without result, owing to inexperience and lack of sufficient care. With greater attention this experiment might very easily be carried to a successful issue.*

II. The Larva.

The only experiments conducted by me with reference to the possible dependence of divergences in the perfect form on larval conditions have been on the influence of temperature, food, and light. In this case also, as regards the first of the three factors, *viz.*, temperature, the experiments consisted entirely in raising it to a height of 25—30° C. (77—86° F.).

(1) *Size.* — The regular, almost invariable, effect was as follows: the more the period of larval feeding was shortened by the raising of the temperature, the better marked was the reduction in size of the imago.

A pair of *L. quercifolia*, of which the male measured 58 and the female 89 millim. across the wings, produced offspring of which, after a sojourn of 70—85 days in the larval, and 12—15 days in the pupal condition, the males measured only 35—37 and the females 36—39 millim. across the wings. *A. fasciata* (male 46, female 48 millim. across) from pupæ collected in the open air, produced three females measuring 36—39 millim. after a larval stage of 68—87 and a pupal of 15—20 days. *Callimorpha dominula*, L., var. *romanovi*, Stgr. ♂ (59 millim.), and var. *persona*, Hb. ♀ (55 millim.), gave rise, after 65—71 days of larval feeding and 14—19 days in the pupal stage, to a form measuring only 35—38 millim. across the wings in more than a dozen examples.

---

* Extensive experiments with reference to the influence of temperature —including a very abrupt change of temperature—on the development of the egg of *Bombyx mori*, L., will be found in the Reports of the Caucasian Silkworm-rearing Station at Tiflis (a Government institution) for the year 1891. Unfortunately they are in Russian.

Although in the following experiments no hybernation of the larva occurred, yet, in contrast to the instances just given, individuals of *A. fasciata* were reared from eggs of the same pair as above, after 142—163 days of larval and 25—31 days of pupal existence, which measured 55—57 millim. in expanse; and eggs of *L. pini*, L. (male 59, female 74 millim.), yielded descendants expanding 65—68 millim. in the male and 84—86 millim. in the female after 150—172 days of larval feeding and 25—37 days in the pupal condition. Here, that is to say, notwithstanding the raised temperature, there appeared to be scarcely any curtailment of the normal period of feeding—of course after deduction (in the case of the latter) of the period of hybernation; and this condition led directly to an abnormal increase of size in these individuals. However simple and comprehensible these facts may appear, they are nevertheless worthy of note; inasmuch as these experimental results throw light on the mode of origin of a large number of species. I will here only mention *Argynnis dia*, L., *Lasiocampa tremulifolia*, Hb., *Boarmia consortaria*, F., —all with short larval periods,—compared with *Argynnis amathusia*, Esp., *Lasiocampa populifolia*, Esp., *Boarmia roboraria*, Schiff., with long larval periods. The respective differentiation of these species, which (apart from the well-marked divergence in size) present so extraordinarily close a resemblance to each other both in the imaginal aspect and also to some extent in that of the earlier stages, has probably resulted, according to these experiments, from the fact that in earlier periods of the earth's history their ancestors while in the larval condition did not react in the same manner to changes of temperature. The differences between the pupal stages of *L. tremulifolia* and *B. consortaria* (hybernating as pupæ) on the one hand, and *L. populifolia* and *B. roboraria* (rapidly emerging) on the other, may have arisen as necessary consequences of and divergence in the larval habit at the time of the establishment of the species.

(2) The *form* and *appearance* of the perfect insects derived from these larvæ which have been forced by means of the raised temperature into new biological conditions do not appear to follow any universal laws. Among the species controlled in this respect entirely by the conditions of their life previous to maturity, the most conspicuous differences of this kind are presented by the second and third brood of *Lasiocampa populifolia*, Esp., that is to say, its two varieties, *æstiva*, Stgr., and *autumnalis*, Jaenich, both of which, and especially the latter, show a more deeply indented border to the wings than does the form resulting from hybernated larvæ. It is, however, in those cases in which Nature herself performs the experiments before our eyes by rearing the particular species during both the cooler

and warmer season of the year, that many well-marked differences —as is partly known, partly still unrecognised—present themselves in the shape of the wings. For this purpose the other portions of the body need scarcely be taken into account. These differences, however, show opposite relations in different species; for whereas *Papilio podalirius*, L., *P. machaon*, L., *P. hospiton*, Géné (when it exceptionally produces a second brood), *Polyommatus thersamon*, Esp., *P. phlœas*, L., *Lycæna argiades*, Pallas, and others (see 'Insekten-Börse,' Leipzig, April 15th, 1894) have their summer form provided with longer tails, and in many cases with a more acute fore wing, as well as a more deeply waved border to the hind wing, *Vanessa c-album*, L., and *V. egea*, Cr., show just the opposite; for in these species the summer form presents the less, and the winter form the greater, amount of indentation.

(3) Moreover, with reference to the colours and markings of the wings and of the upper surface of thorax and abdomen (for these latter must also be taken into account) it is not possible to establish any invariable relation between the imago and the larva reared at a raised temperature. *Lasiocampa* var. *æstiva*, Stgr., and var. *autumnalis*, Jaenich, as also *Urapteryx* var. *olivacea*, Stdfs., become darker than the ordinary forms *L. populifolia*, Esp., and *U. sambucaria*, L., derived from hybernated larvæ, by an increase in the dark elements of the pattern. On the other hand, *Dasychira abietis*, Schiff., and *D. pudibunda*, L., have their second brood lighter in consequence of a reduction in the number of dark scales. To adduce a few similar instances from those that occur in nature: *Papilio podalirius*, L., *P. machaon*, L., *Pieris krueperi*, Stgr., *napi*, L., *daplidice*, L., *Anthocharis belemia*, Esp., *belia*, Cr., *Leucophasia sinapis*, L., *Lythria purpuraria*, L., take on, under an increase of warmth, lighter and for the most part cruder and brighter colours. On the other hand, *Polyommatus phlœas*, L., *P. amphidamas*, Esp., *Vanessa levana*, L., become more dusky under the same conditions (see Zeller, 'Isis von Oken,' 1847, p. 213; Weismann, 'Ueber den Saison-Dimorphismus der Schmetterlinge,' Leipzig, 1875; Seitz, Stettin Entom. Zeitschrift, 1894, pp. 290—307; Standfuss, 'Handbuch für Sammler der europäischen Gross-schmetterlinge,' Guben, 1891, pp. 119—125).

Secondly—as to food—I have also recorded, in my 'Manual,' pp. 116—119, all the facts known to me, whether from the careful researches of other trustworthy entomologists, or from my own observations. Here I need only devote a few words to the subject, especially as the experiments, taken together, only yielded results which were actually or virtually negative.

The feeding of polyphagous larvæ on leaves of monkshood (*Aconitum* sp.), walnut (*Juglans* sp.), deadly nightshade (*Atropa belladonna*, L.), the root of the carrot (*Daucus carota*, L.), raw meat, plants kept fresh in water with which acids, alkalies, dye-substances, common salts, Carlsbad salts,—in short, every kind of substance soluble in water,—had been liberally mixed, invariably produced perfect insects which often enough showed a failure in size or general colouring, but in no case any noteworthy variation in tint or pattern.

In the above-quoted Reports of the Caucasian Silkworm-rearing Station at Tiflis (1891—1893), there are many observations on the influence of factors of this nature. According to these, picric acid, eosin, rodin (ammonio-carmine), and indigo are sufficiently assimilated by the larvæ of *Bombyx mori*, L., to lead to a staining of the silk-fibres. There is no mention in these publications of any effect produced on the corresponding perfect insects. The feeding-experiments were performed in the following manner: twigs of mulberry were steeped in the above-named fluids diluted with water; they were then rinsed in fresh water and given as food.

The third point—that of light—may likewise be rapidly passed over with a mere repetition of the statement in my 'Manual,' p. 119. This is as follows:—"Since I was well aware that the development and growth of plants are strongly influenced by differently-coloured rays of light, I had a number of breeding-cages prepared, each of which was provided with a differently-coloured pane of glass; this experiment, however, gave no positive result, although the larvæ were exposed to the influence of the coloured light from the time when they were quite small." Further experiments carried on up to the present time seem to me to prove that violet light leads to an acceleration both of larval growth and of pupal development; but there is no evidence of any visible influence of this experiment upon the colouring or marking of the perfect insect (see G. Schoch, Mittheil. d. Schweitz. Entomol. Gesellsch. 1880, p. 540).

(To be continued.)

MOTH-ADIPOCERE.

By H. Guard Knaggs, M.D., F.L.S.

In broaching this subject let me premise that, owing to causes which will be explained further on, my experiments in the production of moth-adipocere have not been so successful as I could have wished; but nevertheless, and especially taking into consideration the fact that a repetition of the experiments would occupy six months, they are sufficiently so to warrant the placing of the following notes before your readers.

It has often been suggested that moth-grease is of the nature of adipocere, but beyond the fact that both occur after death, there really does not appear to me to be any defined point of similarity. Adipocere is a formation which takes place in dead human and other bodies at a variable time after death. It is generally agreed that it is caused by ammoniacal gases emanating from the nitrogenous portions of the body, such as the organs, muscles, tissues, &c., combining with the hydrocarbons of the fatty portions.

A very interesting account is given in an article devoted to the subject in 'Taylor's Medical Jurisprudence,' edited by Dr. Stevenson, from which it appears that fat bodies are more readily affected than lean ones, and that in cases of drowning the change is comparatively quickly brought about; the most rapid case recorded (which occurred in five weeks) was that of a body found floating on the water. Another case, mentioned by Devergie, was that of a newly-born infant in a cesspool, which became converted into adipocere in six or eight weeks; but Taylor says the usual time taken in a damp grave is three or four years. He mentions a curious case in which the lower part only of a body half immersed in water became adipocere in fourteen months, while the upper portion above water-level was not acted upon, by which, I presume, it decomposed in the ordinary way. In a case recorded in the Phil. Med. Exam., April, 1847, p. 247, the conversion of the whole body was completed in seventeen years, though the various parts could still be identified. So that water, or at any rate moisture, would appear to be a factor generally necessary for the transformation.

Adipocere is, in fact, an ammoniacal and soapy substance, modified by the salts contained in the water in which it has been formed,—first soft, afterwards harder and lighter, and decidedly hard and brittle when dried. It melts at something over 200° F., and when strongly heated gives off ammonia. It is easily suspended in cold water, and with boiling forms an opaque mixture; acids decompose the solution, forming salts. It is partly dissolved by boiling alcohol.

Now moth-grease (as extracted by pure ether) is a fixed oil rather than a fat, semifluid under ordinary temperature, even below freezing-point. It melts between 75° and 80° F. It gives off no ammonia when heated. Neither water nor alcohol, cold or boiling, has any effect upon it beyond contact with the hot liquid making it still more fluid, and acids do not affect it.

Such being the case, it occurred to me to try to produce by the ordinary forces of nature a genuine moth-adipocere, and accordingly I purchased a dozen *Sphinx* pupæ. My first intention was to kill and pin each moth, on its emergence, on to a loaded stage placed under running water, but the effect seemed to be putrefaction and disintegration. I then pinned the remaining pupæ, most of which had dried up, only two or three remaining heavy, upon the stage; placed them in a wide-mouthed pickle-bottle, and turned on the tap to a steady drip. For the first couple of months I threw in a knob of carbonate of ammonia about once a week, and then left them to themselves for another four months. On examining the result, I found that a wretched slaty-black slug had taken to aquatic habits, and had pretty well cleaned out my pupæ. There was, however, a solid unctuous substance representing the head and thorax of one of the specimens, and greatly resembling a piece of real adipocere which Prof. Stewart kindly gave me some time ago. This has been carefully put away as a treasure for future investigation and exhibition—the sole reward of six months' patience!

Folkestone, Jan. 13th, 1895.

DESCRIPTION OF A NEW LOCAL FORM OF *TROIDES VICTORIÆ* (GRAY) FROM BOUGAINVILLE ISLAND, SOLOMON GROUP.

By the Honourable Walter Rothschild, F.Z.S., F.E.S., &c.

I here use the generic term *Troides*, Hübn., because it has priority by about sixteen years of Boisduval's *Ornithoptera*, and because I so use it in my forthcoming revision of the Old World Papilioninæ. To facilitate the student, I include a comparative description of *T. victoriæ* (type) and its subspecies *T. victoriæ reginæ* (Salv. & Godm.).

Typical *T. victoriæ* occurs in Guadalcanar; *T. victoriæ reginæ* in Malaita; and my new form, *T. victoriæ regis*, in Bougainville. I have a male from Alu which stands intermediate between *T. victoriæ* and *T. victoriæ regis*, which proves the latter to be only a subspecies and not a distinct species, as is also *T. victoriæ reginæ*, for I have seen an intermediate.

MALES.

1. *T. victoriæ reginæ*, Salv.—Fore wings: base shining green, stretching more than or about five-sixths into the cell; rest of wing black, with a very large green subapical patch consisting of three large oblong spots between the 3rd costal and upper discoidal nervules, and a small spot behind the first discoidal nervule. In one of the three existing males the patch reaches to the apex, and is joined along the costa by a narrow green streak to the basal area. Hind wing black, with a large green area extending transversely to just beyond the cell and longitudinally to the apex of the cell, within which the green is much clouded with black scales. The discoidal and upper median nervules generally black, but in one specimen powdered with green scales. Between the upper discoidal and middle median nervules there are three

yellow submarginal spots surrounded by green rings. The under side in the two older forms is almost identical.

2. *T. victoriæ regis*, subsp. nov.—Upper wings: the green basal area only occupies two-thirds of the cell; the green subapical patch as long as in *T. victoriæ reginæ* extremest specimen, but consists only of two spots and a small one behind the 5th subcostal nervule, and on the costa the narrow green line only reaches half-way to the basal area. Hind wings with the green area much enlarged, occupying entirely, or almost entirely, the two discoidal and median cellules. On the under side of fore wings the submarginal green spots are much smaller, and the upper ones are not joined to the central green area of the wings. The excised margin at the anal angle is more deeply cut in than in *T. victoriæ reginæ*, forming a much sharper angle.

3. *T. victoriæ*, Gray.—The basal green area extends further into the cell than in *T. victoriæ regis*, but not so far as in *T. victoriæ reginæ*. The subapical green patch is much smaller and shorter, but consists of three distinct spots, of which the posterior one is smallest. The hind wings have the green area extending as far as or farther than in *T. victoriæ regis*.

FEMALES.

1. *T. victoriæ reginæ*, Salv.—Submarginal spots of both pairs of wings very large.

2. *T. victoriæ regis*.—Submarginal spots very small, sometimes almost obliterated; the discal spots and that at the base of the cell of fore wings also smaller than in the two other local forms.

3. *T. victoriæ*, Gray.—Submarginal spots intermediate in size; subapical and basal spots of cell of fore wings mostly separate, but sometimes merged together as in *T. victoriæ reginæ*.

One specimen of a female is recorded by Mr. Salvin in P. Z. S., 1888, p. 118, as being from Florida Island, Solomon Group; this has the submarginal spots almost as small as in *T. victoriæ regis*. It is probably an error of locality, and most likely the specimen was obtained in the Shortland Islands, Solomon Group, and wrongly labelled by the collector.

Tring.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 15.)

Miana strigilis, Clerck.—This species is somewhat local in Ireland, though widely distributed and often exceedingly abundant; varying much, as in Great Britain. I am of opinion that it tends towards topomorphism. In some localities, for instance, most specimens are characterised by forms with broad white or grey outer bands, while in others the greater proportion are of a dingy type, indistinctly marked, with only the lower portion of the band represented. The bright-banded forms much preponderate at Kenmare, Co. Kerry; Renvyle, Connemara; Markree Castle, Co. Sligo; and Drumreaske, Co. Monaghan; while at Howth, and Lambay I. on the Dublin coast, and Shannon Harbour, where the Bog of Allen reaches the Shannon, and Castle Taylor, Co. Galway, obscurely marked forms are chiefly in evidence. It would be desirable to investigate more fully if any special forms affect island or rocky coast localities, and if any local characteristics pertain to the neighbourhood of bogs and moors, as well as the barren limestone regions of Galway and Clare. The classification of variations given in Tutt's 'Variations of Noctuæ,' is based on such minute distinctions that I am unable to follow the arrangement. The difference between "reddish brown," "reddish black," and "blackish brown," when, as we know, they grade insensibly into each other, requires a discrimination which few people possess, and seems an inadequate basis for varietal names. Clerck's type, too, seems to be given as very different from that accepted usually on the Continent, and adopted by Staudinger, Sven Lampa, and others, namely, having blackish fore wings, with a broad white subterminal band. This form, as I have said, is abundant in some Irish localities, and appears somewhat localised.

Ab. *latruncula*, Lang.—Of a lighter hue, reddish, with whitish or brownish outer fascia. This seems the most common Irish form.

Ab. *ærata*, Esp., 146, 4, 5, with coppery ground colour, with distinct reddish fascia, occurs occasionally.

A unicolorous pale sooty brown form (which does not correspond toTutt's *unicolor* "blackish red," nor to Haworth's *latruncula*) is frequent at Howth, as well as ab. *fasciata*, Tutt, the greyish fascia often tending to become obsolete, so making a transitional form to the following.

Ab. *æthiops*, Haw.—Rare in Ireland. Howth; not scarce.

Of the group with greyish ground colour I have only met with two Irish specimens, namely, ab. *præduncula*, Haw., marked with red and black on the central area, Kenmare, Co. Kerry; and ab. *suffuruncula*, Fr. (not Tr., which is referable to *M. literosa*), with a very bright pink central band enclosing the two stigmata, with a slight similar tinge along the outer margin; Markree Castle, Co. Sligo.

MIANA FASCIUNCULA, Haw.—Common in most localities. The ruddy type appears to be somewhat localised, and is not so frequently met with as the muddy grey form named var. *pallida*, Tutt. The pale var. *cana*, Stdgr., with reddish central band, I have never met with in Ireland. The var. *suffusa*, Tutt, an obscure sooty brown to almost black colour, parallel to ab. *æthiops*, of the preceding species, I have frequently taken in many localities. It is not scarce at Howth and Drumcondra, near Dublin; at Drumreaske (occasional), Co. Monaghan; Favour Royal, Tyrone; Armagh (*J.*); and occurs at Shannon Harbour, King's Co.

MIANA LITEROSA, Haw.—A shore species, frequently abundant on the Irish coasts; but very rarely met with inland. It has been taken in the Co. Westmeath, at Killynon (*Miss R.*) and Cromlyn (*Mrs. B.*); Belfast, abundant (*W.*); Portballintrae (*J.*), Co. Antrim; Culmore, near Derry, abundant (*C.*); and on the shores of L. Swilly, at Carrablagh (*G. V. Hart*), and elsewhere; Inver, Co. Donegal; near Sligo; Waterville, Co. Kerry; Minehead and Glandore, Co. Cork; Arklow and Greystones, Co. Wicklow; Killiney (*S.*) and Howth, Co. Dublin; Castle Bellingham, Co. Louth (*Thornhill*).

MIANA BICOLORIA, *Vill.*—Local, and sometimes very abundant on the sea coast. In sparse numbers, where found, in inland localities. Newman was in error in stating it to be so generally distributed in Ireland. I have rarely met with it; and have never seen but one example of the type strongly marked, which was sent me by Mr. Dillon, taken at Clonbrock, with other lighter specimens. It has the basal half of the wing of a deep sepia-brown. At St. John's Point and Clogher Head the type occurs sparsely in very light colouring; and Mr. Thornhill takes it at Castle Bellingham on the same coast, Co. Louth. The most numerous form seems to be the var. *albicans*, Tutt, a pale grey unicolorous insect, which is found very large and fine on the southern shores of Dingle Bay in Kerry; but very small at Kinsale, Arklow, and Kilcool, Co. Wicklow, Howth, and the Louth localities above mentioned. The var. *rufuncula*, Haw., is equally dwarfed, and is usually found at Howth in abundance with the grey form, and on the Louth coast sparingly. It occurs also at Clonbrock, and Killynon (*Miss R.*), Co. Westmeath, rarely. Var. *pulmonaria*, Dup., is not a rare form at St. John's Point and on the Louth coast and Howth. Haworth's *terminalis*, a brownish unicolorous form, is frequent at Clogher Head, and occurs rarely at Howth. It will be seen, therefore, that Irish specimens are generally very dwarfed, and are frequently unicolorous, always faintly marked and coloured. Even where the type occurs it is usually characterised by faded tones.

MIANA ARCUOSA, *Haw.*—Very widely spread, and in some localities abundant. The males vary from a dingy putty colour to white, which appears to be var. *morrisii*, and is not uncommon in Ireland. A more richly-marked form sometimes, but rarely, occurs too; but I have never taken it myself. Localities: Derry and the Giant's Causeway (*C.*); Castle Rock, Co. Antrim, and

Newcastle (*Bw.*); Colin Glen, Belfast, abundant (*W.*); Mount Charles, Donegal; Armagh (*J.*), Drumreaske, Monaghan, and Favour Royal, Tyrone, plentiful; Belleisle and the shores of L. Erne generally, abundant; Farnham, Cavan; Killynon (*Miss R.*) and Cromlyn (*Mrs. B.*), Co. Westmeath; Castle Bellingham (*Thornhill*), Co. Louth; Howth (*G. V. H.*), scarce; Powerscourt, Co. Wicklow (*B.*); Cappagh and near Waterford; along the shores of L. Derg and the Shannon at Scariff, Dromineer, and near Banagher, and common at Clonbrock and elsewhere in Galway.

(To be continued.)

NOTES AND OBSERVATIONS.

Jumping Beans and Jumping Eggs.—Miss Hopley's remarks on "jumping eggs" remind me of my first acquaintance with this phenomenon in the year 1866, having obtained it from the larva of *Tæniocampa stabilis;* this proved to be a parasite, and described by Bridgman in the 'Transactions' of the Entomological Society of London, July, 1882, p. 151, under the name of *Limneria kriechbaumeri.* I have obtained the "jumping egg" many times since then; a description of it and its habits will be found in the 'Entomologist' for 1882, pp. 215, 216. At Plymouth, as the majority of your readers, I have no doubt, are aware, we have a Marine Biological Laboratory, and during the summer season it is used by professors and lecturers from the different colleges for study. About four years since I visited the establishment for the purpose of showing the gentlemen then at work there the actions of the pupa of *L. kriechbaumeri*, and introduced it to them as a "jumping seed." I placed it in the middle of a large newspaper, opened out; it did not move for several seconds, but when it did, I think the first bound was over two feet, and it continued jumping until the students were tired of the performance; they, one and all, admitted that it was most extraordinary, and remarked if they had not seen the action they could not have believed it. The way this curious action is performed is exactly the same as the "hoppers" in old cheese; it brings its head and tail together, and suddenly jerks itself, causing the cocoon to spring sometimes over three feet. But why? For protection. The cocoon,* dropping to the ground, is at once surrounded by many dangers, trodden under foot by some animal, or eaten by birds, if it remained exposed. I have found, by several experiments made with them, that they keep up this jumping action until they suppose they have buried themselves under some fallen leaves or crevice in the ground. When the bounding is obstructed it will commence to roll, and when it can roll no further or jump, it will cease trying; but if again taken out, it will repeat the programme over again until it again finds itself secure. I trust that Mr. Roland Trimen will solve his problem, and that I shall have the pleasure of reading it in the 'Entomologist'; or, if Mr. Trimen would like a specimen of my "jumping seed," I will send it to him with much pleasure (not living). — G. C. Bignell; 7, Clarence Place, Stonehouse, Plymouth, Jan. 30th, 1895.

---

* The cocoon is figured in the 'Entomologist,' June, 1884, plate 2, fig. 27, suspended. It only remains thus for a short time; the first gust of wind breaks the thread, or, if there is no wind, the larva within gets impatient and by its jumping breaks the silk, when it falls to the ground.

Jumping May-buds.—*Apropos de* my old friend Miss Hopley's most interesting note on "Jumping Beans and Jumping Eggs" of Table Mountain, I may remark that we possess a somewhat similar curiosity at home. In the Ent. Mo. Mag. vii. p. 282, I wrote:—"*Jumping May-buds.*—I would advise our readers to gather boughs of 'May' in order to observe the antics of a coleopterous larva which produces the above phenomenon." It is so long ago that I rather mistrust my memory, but I know that I had a particularly early-blossoming hawthorn, and that my greengrocer used to beg a bough every spring in order to be the first to bring "May" to Covent Garden; and I believe that, having brought a branch indoors (a most unlucky thing to do, so I'm told), I was much astonished and amused at the queer tricks performed by the buds which had fallen upon the table.—H. G. Knaggs; London, Feb. 5th.

Liparis salicis in the London District. — Referring to previous remarks regarding the scarcity of *L. salicis* in or near London, I am able to state that I have found it in greater abundance in the London district than in any other locality where I have collected. The larvæ occur freely in most seasons at rest on poplar-trunks in Bedford Park. They were also found in great abundance in 1893 at Harlesden, where I once took the pupæ in astonishing numbers spun up on palings. It was formerly quite a common species at Shepherd's Bush, W.—Alfred T. Mitchell; 5, Clayton Terrace, Gunnersbury, W., Jan. 28th, 1895.

Vanessa urticæ, var. connexa, in Scotland. — Among several specimens of *V. urticæ* reared in Sutherlandshire last summer and selected on account of variation from the usual form (although the amount of variation in the majority of them is exceedingly small), I have one in which the central black costal patch is united with the black patch on the inner margin by a band so densely covered with black scales as to give the appearance of a black band reaching continuously from the costa to the inner margin of both fore wings. Mr. Bonaparte-Wyse records the rearing of a similar form in Co. Waterford last year (*ante*, p. 57), and he has very kindly sent me his four specimens for comparison with the Scotch example, with which the most strongly marked one agrees very closely, except in the matter of size, the specimen from Sutherland being somewhat the larger; the other three show various gradations, in the least strongly marked of which the connection between the two black blotches is made up of sparsely scattered black scales, and has the appearance of a dark shade. The form, although rare in Britain, has occasionally been met with, and is figured by Newman in his 'British Butterflies' (p. 32); in Japan, however, it appears to be the prevailing form, and is the *Vanessa connexa* of Butler, of which a good illustration is given in a previous volume of this Journal (Entom. xxii. pl. viii. fig. 3). The Scotch example under notice agrees very closely with this figure.—Robert Adkin; Lewisham, February, 1895.

Variation of Vanessa urticæ in Ireland.—A variety of *V. urticæ* intermediate between var. *connexa*, Butl., and the type seems to occur in many localities in Ireland. In 1893, when the species was unusually abundant, I observed specimens of this variety at Westport (Co. Mayo), at Howth, and near Belfast. The two specimens taken at Howth are of a peculiar dull-red colour, with the wings thinly scaled, and so partially translucent.—C. W. Watts; 40, Goldhurst Terrace, N.W.

The Entomological Club.—A meeting of this Club was held at the Holborn Restaurant on Tuesday, Jan. 15th, when members and friends to the number of upwards of forty assembled at the invitation of Mr. G. H. Verrall, who presided. In the course of a short address, in which he referred to the antiquity of the Club, it being the oldest association of entomologists in the kingdom, Mr. Verrall announced the resignation of Mr. South as honorary secretary, on account of his removal from London, and expressed a hope that by the next meeting one of the members would offer his services for the vacant post; he dwelt upon the benefits of social intercourse among entomologists afforded by the Club, and which were offered by no other institution, and suggested that it would be for the consideration of the members whether the time had not arrived when it would be well to fill the three vacancies which at present existed in the membership, having regard to candidates that would worthily uphold the traditions of the Club.

CAPTURES AND FIELD REPORTS.

Notes on the Season 1894.—On comparing the past season with that of 1893, it certainly does not show up well, but on the whole I have not found it so bad as many of your correspondents seem to have done. The early spring months, with *Nyssia hispidaria* so common in Epping Forest and the sallows so productive, certainly gave rise to greater expectations than the next few months realised, but July again was better, and so was the autumn.

The sallows at Epping and Theydon turned up the usual species, with plenty of *Tæniocampa munda* and a fair sprinkling of *T. populeti* ova being obtained from each; but up to the end of May, when I spent a week at Brockenhurst, little success was met with, except with larvæ. Of these the principal were a lot of *Callimorpha dominula* and *Bombyx quercus*, from Deal on Easter Monday; a very few *Trochilium apiformis* and *T. bembiciformis*, near Woodbridge; a dozen *Apamea ophiogramma*, from ribbon-grass in my garden; and the following beaten out during two evenings in Epping Forest, viz., *Pœcilocampa populi* (3), *Nola cucullatella* (abundant), *Phigalia pilosaria* and *Nyssia hispidaria* (both very common), *Scotosia rhamnata*, *Petasia cassinea* (2), and *Amphipyra pyramidea*. Other larvæ taken at Brockenhurst between May 26th and June 2nd, were *Argynnis paphia*, *Vanessa polychloros* (two nests of about 30 each), *Thecla quercus* (common), *Halias quercana* (7, two of which were devoured by *Cosmia trapezina* accidentally introduced into the chip-box coming home), *Psilura monacha* (9), *Trichiura cratægi* (1), *Phigalia pilosaria* and *Nyssia hispidaria* (both common), *Boarmia roboraria* (1), *Petasia cassinea* (3), *Asphalia flavicornis* (2), *A. ridens* (1), *Tæniocampa munda*, *T. miniosa* (very abundant in all stages of growth), *Agriopis aprilina* (6, five of them on treacle), and *Amphipyra pyramidea*. After the very commonest species, *T. miniosa* was perhaps the most plentiful.

Imagines of all kinds were scarce, and at the beginning of the week the outlook was not rosy. Things improved as the week went on, however, and on the whole the result was better than at first expected. The following were taken during the day, night proving a dead failure in all ways:—*Argynnis euphrosyne* (abundant), *A. selene* (just coming out), *Nemeobius lucina* (20 in all), *Gonopteryx rhamni* (common), *Macroglossa fuciformis* (common at Rinefield, and a few in New Copse), *M. bombyliformis* (4, in New Copse), *Macaria liturata*, *Bupalus piniaria* (males abundant—one of them very white—and two females), *Anaitis plagiata* (8), *Platypteryx falcula*, *Hadena dentina*, *Euclidia mi*, and *Phytometra ænea*. Everything was far behind time, many of the usual species such as *Bapta taminata*, *Lithosia aureola*, *Platypteryx lacertula*, *P. hamula*, *P. unguicula*, &c., not turning up at all, and all Geometers were very scarce.

After a week's interval I tried my luck at Hailsham, but although undoubtedly night work had improved, everything was still very backward, and there was generally a great lack of insect life in the woods; in fact, only five species of Macros were really common, viz., *Argynnis selene*, *Pechypogon barbalis*, *Iodis lactearia*, *Asthena candidata*, and *Melanippe montanata*, whilst *Lycæna adonis* was in great form on the downs by Glynde. The following occurred from time to time, more or less commonly:—*Melitæa athalia* (hardly out), *Pyrameis cardui*, *Thecla rubi*, *Anthocharis cardamines*, *Limacodes testudo* (a single female beaten out by Mr. Lowe of Guernsey), *Zygæna trifolii*, *Halias quercana* (two cocoons), *Lithosia mesomella*, *Gnophria rubricollis*, *Arctia villica*, *Eurymene dolobraria*, *Boarmia consortaria*, *Ephyra porata*, *Acidalia subsericata*, *Melanippe hastata*, and *Platypteryx falcula*. Although no beating was done, larvæ of *Trichiura cratægi*, *Eriogaster lanestris*, *Bombyx quercus*, and *Psilura monacha* turned up now and again, the latter on treacle. As regards numbers, treacle was no great success, perhaps forty or fifty moths, all told, being about the average number on the trees per evening. Of this very limited company, the species were fairly numerous, the best of them being *Thyatira derasa*, *Diphthera orion*, *Acronycta leporina*, *A. ligustri*, *Leucania comma*, *Xylophasia hepatica*, *Apamea gemina*, *Grammesia trilinea* (and var. *bilinea*), *Rusina tenebrosa*, *Agrotis suffusa* (a single small specimen), *Noctua festiva*, *Aplecta herbida*, *A. nebulosa* (common), *Hadena adusta*, *H. dentina*, *Gonoptera libatrix*, *Boarmia consortaria*, a single *Melanthia albicillata*, and some more *Agriopis aprilina* larvæ. I was very lucky as regards weather, as, with the exception of several heavy showers, rain kept off all the week.

Larvæ continued to be found during the early part of the month at Chingford; *P. pilosaria* and *N. hispidaria* were still abundant; a few *Cossus ligniperda* in the willows on Chingford Plain; and *Orthosia upsilon* commonly under the loose bark of the same trees; *Halias quercana* came down from oak; seven *Trichiura cratægi* from blackthorn; and *Pseudoterpna cytisaria* on the genista at High Beech; but for the next month I did no collecting at all away from London, and very little there. *Eupithecia* *isogrammata* was common in a garden at Stamford Hill, where it has been breeding for years past on a clematis-covered summer-house; and a few odd things came to light at Crouch End towards the end of July, including *Eupithecia subfulvata* and *Dianthœcia capsincola;* but on July 19th I ran down to Benfleet for *Hesperia lineola.* After taking one in an hour and a half, rain coming on in torrents prevented any further search, but from the specimen I took evidently being just out, I should imagine it was too early, although many were worn three days earlier in 1892.

The following day was spent at Darenth Wood, but the wood itself seemed most strikingly empty. One *Thecla quercus* was seen, *Epinephele hyperanthes* fairly common, a few *Hesperia sylvanus*, &c., but common moths of every kind seemed almost absent. The only thing worth having was a fine fresh *Acronycta leporina*, at rest on a brake—surely very late for the species. The neighbouring lanes, however, were in great contrast with the wood, the hedges, and especially the clematis, being full of Geometers. A large majority of the specimens beaten out were various small Acidalias, the best of them being *A. rusticata;* plenty of other species also turned up, including *Iodis vernaria* (3), *Ligdia adustata, Eupithecia isogrammata, Melanippe procellata, Scotosia rhamnata,* and *Triphæna ianthina* (common).

All this time treacle had been a dead failure; but on July 27th, at Darenth Wood again, it began to look up. Starting from Dartford, I again beat out *Iodis vernaria, Ligdia adustata, E. isogrammata,* and *S. rhamnata* (the latter fairly common); and in addition, *Acidalia imitaria, Strenia clathrata* (abundant in the clover-fields), *Phibalapteryx vitalbata, Agrotis nigricans, Triphæna interjecta,* and *Platypteryx falcula* in the wood; *Pyrameis cardui* was seen at intervals, with a couple of *Gonopteryx rhamni*, and a number of *Bombyx quercus* males; *Leucoma salicis* was found in a hedge in Dartford; a single *Boarmia abietaria* on a fence on the common; whilst *Angerona prunaria* and *Acidalia emarginata* were netted at dusk. At treacle pretty well everything that came at all came the first round. There was a fair variety, the best being *Leucania lithargyria, Caradrina blanda, Rusina tenebrosa* (worn), *Agrotis nigricans, A. tritici,* and *Orthosia suspecta.* This in itself was not much, but it gave a promise of better things, to be fulfilled in the course of a day or two when, treacling at Hailsham (Aug. 1st and 2nd), moths, mostly common, literally swarmed. The best captures, perhaps, were a grand series of *Cosmia trapezina*, which was by far the commonest moth and in endless variety, and a smaller but equally variable one of *Apamea oculea; Calligenia miniata* and *Halias quercana* occurred singly, the vivid green of the latter when seen in the lamp-light for the first time being rather startling. Other insects to turn up were *Leucania conigera, L. lithargyria, L. comma, Hydræcia nictitans, Miana literosa, Caradrina blanda, Agrotis suffusa, Noctua plecta, N. dahlii, N. baia, Cosmia affinis, Amphipyra pyramidea, Mania maura,* and a good number of *Hypsipetes elutata* (the only Geometer).

Excessive rain and the condition of the woods prevented any day work, except a morning on the Polegate Downs on Aug. 3rd. There was a high wind, and the only butterflies to brave it were vast numbers of *Satyrus semele;* in all the sheltered hollows *Lycæna corydon* and *Eubolia bipunctata* swarmed, with occasional *Argynnis aglaia* and *Melanippe galiata, Hesperia linea* occurring rather locally. On the two previous mornings male *Bombyx quercus* were commonly to be seen on the wing, apparently indifferent to wind and heavy rain.

Just at this time treacle seemed to be attractive in the London district, my cousin Mr. Ogden having a very successful evening at Hale End on Aug. 3rd, taking *Leucania lithargyria*, *Hydræcia nictitans*, *Caradrina blanda* (8), *Agrotis tritici*, *A. ravida*, *Cosmia affinis*, *Noctua umbrosa*, and *Mania maura;* but from this time it again fell quite flat until mid-September.

August was spent mostly at Whitby, but no regular collecting was done; insects seemed very scarce, and when tried on one or two occasions, treacle failed absolutely. *Charæas graminis* and *Cidaria testata* were seen occasionally on the moors, *Polia chi* on the stone walls, and *Argynnis aglaia* commonly at Heyburn Wyke, but beyond this nothing worth noting.

Just a very few things came to treacle in early September near Woodbridge, including *Hydræcia nictitans*, *Agrotis suffusa*, *A. puta*, *Noctua c-nigrum* (common), *N. rubi*, and *Catocala nupta.* Larvæ of *Amphidasys betularia*, *Platypteryx hamula*, *Cilix spinula*, and *Acronycta tridens* were beaten, and pupæ of *Nonagria typhæ* obtained from the reeds; whilst a moth-trap which was tried every night only attracted one *Smerinthus populi* (very late), one *Notodonta camelina*, *Aspilates citraria*, *Luperina testacea*, and a few very common things. Three specimens of *Ennomos erosaria*, one of which gave me a nice batch of ova, and a single male *Colias edusa*, complete the Suffolk list.

Lamps proved attractive at Crouch End during the month, *Agrotis ravida* occurring again on Sept. 6th and laying a number of ova; good series of *Anchocelis lunosa* (with red forms) and *Luperina testacea*, four *Hydræcia micacea* and two *Catocala nupta* are the only others worth mentioning. On the 7th *Lycæna adonis* was well out at Redhill, and a fortnight later (Sept. 20th) a female *Thecla betulæ* was taken near Chingford. At last, just beyond the half-month, treacle began to draw again, and working Winchmore Hill six or seven times between the 17th and 28th practically finished up the season for me. Although not nearly so good as the 1893 autumn treacling, a decent number of species turned up; *Anchocelis pistacina* again took the lead, as last year, but *Phlogophora meticulosa* ran it pretty close, often four or five on a tree together; *Cerastis vaccinii* was hardly out when business stopped me at the end of the month, but *Anchocelis litura* was just in time, and on the last day or two I managed to obtain a short but good series. *A. lunosa* was abundant on the 17th, but dropped off afterwards. *Catocala nupta* turned up one or two each evening, and although not common, I got together a nice little series of *Asphalia diluta.* Other captures were *Scopelosoma satellitia* (common), *Anchocelis rufina*, *Hadena proteus*, *Noctua c-nigrum*, *Xylina rhizolitha*, *Agrotis suffusa*, *Xanthia ferruginea*, *X. cerago*, *X. silago*, *Amphipyra pyramidea*, *Hypena rostralis*, and on the 28th quite a fresh *Xylophasia polyodon.* Little else occurred during the remainder of the year, except *Hypena rostralis* on a lamp at Stamford Hill on Oct. 16th, and an apparently fresh *Plusia gamma* as late as Nov. 10th at Crouch End; but although the year might certainly have been very much better, it might equally have been very much worse; and, on the whole, I do not think I should class 1894 with the worst of entomological seasons.—RUSSELL E. JAMES; 3, Mount View Road, Finsbury Park, N., Jan. 30th, 1895.

LEPIDOPTERA IN THE BLOXWORTH DISTRICT, DORSETSHIRE, IN THE SEASON OF 1894.—Please allow me, though rather late in the day, to add my small testimony to the already abundantly testified peculiarities of the past season. The general character of the year 1894 was wet, cold, and thoroughly ungenial, excepting about a fortnight at the end of June and beginning of July, which was fine, fairly warm and seasonable. Many of the commonest Lepidoptera either made no appearance at all, or required close search to find them. I noticed, however, some few exceptions to this, and in one or two cases species hitherto scarce were abundant. Among the exceptions alluded to, *Tortrix viridana* was excessively abundant in some (fortunately restricted) localities. The larvæ also of *Halias prasinana* were abundant, but not followed by any corresponding plenty of the perfect insect. I did not see a single specimen all the season of *Pontia brassicæ*, and only a very few of *P. rapæ*. *Epinephele ianira* was also very scarce, while *Cœnonympha pamphilus* was rather abundant, as also was *Nemeobius lucina;* of this last pretty little butterfly (which occurs here every year in greater or less numbers), I caught three one afternoon with one stroke of my net. Sugaring was tried at various times, but after some repeated trials, when scarcely an insect of any kind appeared, it was relinquished. The following were among the best captures of the season; almost all are Micro-Lepidoptera, the Macros being conspicuous by their absence. I have not thought it worth while to place the following insects in systematic order, but have merely jotted them down as they occur in my notes of the season:—*Phycita abietella* (3), beat from Scotch firs. *Phoxopteryx subarcuana*, abundant. *Bactra lanceolana*, two of the richest golden brown variety I have ever seen. *Phoxopteryx diminutana*, several. *Aciptilia paludum*, very scarce; only two or three. *Aventia flexula*, one; in a gooseberry bush. *Stigmonota coniferana*, one; from Scotch fir. This is the first I have ever taken here. *Emmelesia unifasciata*, one. *Zelleria insignipenella*, two; beat from underwood. *Cleodora cytisella*, abundant (though usually scarce); swept among common bracken; a large proportion necessarily much injured by sweeping among this stiff wiry fern. *Retinia pinicolana*, one; from Scotch fir. *Melanippe unangulata*, several; in some seasons it is fairly abundant. *Chauliodus illigerellus*, abundant. *Amblyptilia cosmodactyla*, one. *Cosmopteryx orichalcella*, very abundant. This is only the second recorded occurrence of the species in Dorsetshire; two years ago (1892) I met with two specimens on July 7th, among herbage in a wood at a considerable elevation, and on a chalk soil; this last year (1894) it occurred abundantly, a long distance from the chalk, among coarse grass in a swampy spot on the heath, from June 13th to July 13th. Almost all were obtained by sweeping, a few only being observed and boxed sitting on grass stems; on some evenings I met with from forty to fifty, and after discarding numbers injured in sweeping there remained about 230 specimens, some—in fact, a fair proportion—being as fine as if bred. Fresh specimens were still appearing, when, on July 13th, I was obliged to give over the search. After consultation with Mr. Eustace Bankes as to the probable time of the appearance of a second brood, I again worked the same spot repeatedly, in August and early in September, but saw no trace of the species. It seems, therefore, doubtful whether it is of double appearance or not. *Elachista gleichenella*, very scarce; in some seasons it is abundant. *Pancalia lewenhoekella*, one. *Elachista paludum*, very scarce. *Eupœcilia geyeriana*, very scarce in its original locality, but more abundant in a fresh locality at a considerable distance, and on a heath-bog—a totally different kind of situation from that in which it had been before found in this district. The larvæ must, probably, in this new spot, have bred on the common lousewort (*Pedicularis sylvatica*), as the marsh lousewort (*Pedicularis palustris*) does not grow anywhere in the neighbourhood. *Phoxopteryx siculana*, rare; only three or four.—(Rev.) O. P. Cambridge; Bloxworth Rectory, Feb. 11th.

HYBERNIA DEFOLIARIA IN DECEMBER.—On Dec. 28th I took two male *Hybernia defoliaria* off Knole Park fences, near Sevenoaks; they exactly represent the two forms figured in Newman.—D. P. TURNER; 14, Havelock Road, Tonbridge, Jan. 17th, 1895.

[This species has been occasionally observed in the spring, and in 1891 was taken as late as March 4th (*vide* Entom. xxiv. 99).—ED.]

EARLY APPEARANCE OF PHIGALIA PEDARIA — A specimen of this insect, evidently newly emerged, I obtained at electric light, at 11 p.m. on December 14th, which was very mild and raining. Is not this an exceptionally early emergence? — CLAUDE A. PYETT; 28, Waterloo Road, Ipswich. [This species was observed in November, December, and January, during the winter of 1873–4 (Entom. vii. 91). In 1893 Mr. Reid, of Pitcaple, obtained a female specimen on December 27th (Entom. xxvii. 147). A specimen was taken in 1882 as late as the middle of June (Entom. xx. 110).—ED.]

GREAT ABUNDANCE OF LARVÆ OF ABRAXAS GROSSULARIATA, 1894.—I could not help noting the immense numbers of these larvæ upon *Euonymus* last autumn. Nearly every plant of any size was infested with them. I noticed that the imago was particularly common last season, even in the high roads, and was found flying in the broad daylight. It would be interesting to know if these larvæ were found in any abundance on currant or gooseberry bushes. I had quite as many larvæ to hybernate as I could manage, or I should have been tempted to secure a large quantity for variety breeding.—A. T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., Jan. 28th, 1895.

LARVÆ OF YPSIPETES RUBERATA.—In April last, while searching for pupæ under the loose bark on some railings, I found several small yellowish larvæ enclosed in a loose cocoon in a rather advanced state of pupation—one or two had only just spun up. Quoting from Newman's 'British Moths,' "The caterpillar is described by Mr. Machin as rather hairy, and of a dirty white or greyish colour. Mr. Doubleday informs me that it changes to a shiny black chrysalis in the autumn, and remains in that state through the autumn." The larvæ I found were not hairy, and evidently must have hybernated. Unfortunately, several of the imagines emerged hopeless cripples, and I only succeeded in obtaining one perfect specimen. —A. H. BLAKE; High Street, Biggleswade.

NOTES FROM FOREIGN PERIODICALS.

ABNORMAL EMERGENCE OF ENDROMIS VERSICOLOR.—Out of twenty-seven healthy pupæ obtained last autumn nineteen yielded imagines in April. The remainder of the insects not emerging at the proper time, the pupæ were put out in the garden for the winter. An imago was observed in the breeding-cage on October 11th, and seven others emerged in the next eight days.—(L. FROSCH, *Societas Entomologica*, xi. 19, 148, 1894.)

AN ATTEMPT TO CROSS BOMBYX CASTRENSIS AND B. ALPICOLA.—Herr Selmons has attempted to obtain a hybrid between *B. castrensis* and *B. alpicola*, but without success. A union was obtained between a female *castrensis* and a male *alpicola*, but only one instance of successful copulation was observed; three eggs only were laid, before the death of the female. On the other hand, seven pairs were seen to copulate when female *alpicola* were placed in the box with male *castrensis*, and four females deposited a large number of eggs, all of which proved unproductive. The other three females died before depositing any ova.—(*Societas Entomologica*, Jan., 1894.)

The Cocoon of the Hessian Fly. — In a note on *Cecidomyia destructor*, Say, M. Fanet remarks:— To suppose that what is known as the "flaxseed" stage of the Hessian fly is simply the naked pupa, is a very singular error. The "flaxseed" is merely the cocoon of the insect and the pupa is inside. The cocoon instead of being silky is formed of a homogeneous material, which at first is soft and transparent, becoming hard and brown on drying. On breaking the cocoon or shell, it is easy to find the cast skin of the larva lying beside the true nymph. Occasionally the larva is dead and dry, having succumbed before undergoing its transformation. Entomologists generally had noticed that the "flaxseed" was devoid of segmental sutures, and had considered it abnormal, but at the same time had looked upon it as a characteristic of the pupa of the Hessian fly.*—(*Ann. Soc. Ent. de la France*, Nov., 1894.)

Sale of the Lethierry Collection of Beetles.—This well-known collection of Coleoptera came under the hammer on the 3rd and 4th of December last. From the few instances reported they do not appear to have reached fancy prices. The families Pedilides, Anthicides, Pyrrhochroides, and Mordellides, comprising 228 species, of which 89 were *Anthicus*, were knocked down to M. Pic for 58 francs (£2 6s. 8d.), an active bidder being M. Abeille de Perrin. At the sale of books which took place the following day, the 'Botanical Magazine' went for 850 francs (£34), and the 'Bulletin de la Soc. Linn. de Paris,' of which there exist only four or five complete sets, brought 150 francs (£6).—(*Le Naturaliste*, 187, p. 285.) W. M.

SOCIETIES.

Entomological Society of London.—*February 6th*, 1895.—Professor Raphael Meldola, F.R.S., President, in the chair. The President announced that he had nominated the Right Hon. Lord Walsingham, F.R.S., Mr. Henry John Elwes, F.L.S., and Professor Edward B. Poulton, F.R.S., Vice-Presidents of the Society for the Session 1895–96. Mr. Charles Nicholson, of 202, Evering Road, Clapton, N.E., was elected a Fellow of the Society. Mr. W. F. H. Blandford made some remarks regarding M. Brongniart's donation to the library of his monograph entitled "Recherches pour servir à l'histoire des Insectes Fossiles des Temps Primaires." Mr. Blandford also called attention to figures of pupæ of species of *Spalgis* (Lycænidæ), in the Journal of the Bombay Natural History Society. A discussion followed, in which Mr. Hampson and Mr. McLachlan took part. Canon Fowler exhibited, on behalf of Mr. C. A. Myers, an unusually fine specimen of *Sphæria robertsi*, growing from the prothorax of an underground larva of an *Hepialus*, supposed to be *H. virescens*, from New Zealand. Mr. McLachlan said that there was a doubt whether the caterpillar should be referred to this species. Mr. Blandford stated that the French Government had set aside a section of the Pasteur Institute at Paris for the study of entomophagous fungi. Professor L. C. Miall and Mr. N. Walker communicated a paper entitled "On the Life-history of *Pericoma canescens* (Psychodidæ)," with an Appendix by Baron Osten-Sacken. Herr Jacoby read a paper entitled "Contributions to our knowledge of African Phytophagous Coleoptera." Dr. D. Sharp remarked that Erichsen began the 'Insekten Deutschlands' some sixteen years ago, and as he was engaged on a classification of the Coleoptera of the world, he included a considerable number of these exotic species in his work. Mr. G. F. Hampson read a paper entitled "Descriptions of new Heterocera from India."—W. W. Fowler, *Hon. Sec.*

---

* In England the term "flaxseed," when used by entomologists in connection with *Cecidomyia destructor*, is generally understood to refer to the puparium of that insect; *cf.* Miss Ormerod's observations on the species (Trans. Ent. Soc. Lond. 1887, p. 3), and Mr. Enock on the life-history of the Hessian fly (T. E. S. 1891, pp. 329—365).—Ed.

South London Entomological and Natural History Society.—*January* 24*th*, 1895.—*Annual General Meeting.*—Mr. T. W. Hall, F.E.S., Vice-President, in the chair. The Council's and Treasurer's Reports were read, and the Officers and Council for the year were elected as under:—President, T. W. Hall, F.E.S.; Vice-Presidents, C. G. Barrett, F.E.S., and J. Henderson; Treasurer, R. Adkin, F.E.S.; Librarian, H. J. Turner, F.E.S.; Curator, W. West (Greenwich); Hon. Secretaries, Stanley Edwards, F.L.S. (Corresponding), and Hy. J. Turner, F.E.S. (Report); Council: T. R. Billups, F.E.S.; C. A. Briggs, F.E.S.; J. H. Carpenter; C. Fenn, F.E.S.; F. E. Filer; W. Mansbridge, F.E.S.; and W. A. Pearce. In the absence of Mr. Step, the retiring President, Mr. Hall read the Annual Address.

February 14*th*.—Mr. T. W. Hall, F.E.S., President, in the chair. Mr. W. Furneaux, F.R.G.S., of Omany Road, New Cross, was elected a member. Mr. Peach exhibited a specimen of the genus *Xanthia*, said to be *X. ocellaris*, but which all present considered merely a var. of *X. gilvago*; it was from Wimbledon. Mr. Adkin, *Vanessa urticæ*, L., var. from Sutherland and N. Ireland, and commented upon the similarity of these to the Japanese form called *V. connexa*, Butl. He also exhibited series of *Zygæna filipendulæ* from Sutherland, taken 2000 ft. above the sea. Mr. Williams, series of *A. cardamines*, L., with examples of a form which some authorities term *A. alberti*, and read notes thereon.—Hy. J. Turner, *Hon. Report Secretary.*

Birmingham Entomological Society.—*January* 14*th*, 1895.—Mr. G. H. Kenrick, President, in the chair. Dr. F. A. Dixey, of Oxford, delivered a lecture entitled "The Growth of Mimetic Patterns in Butterflies." He first of all showed, with the aid of lantern slides, what he believed to be the line of development of the Pieridæ, from an original uniformly neutral-coloured ancestor; and then, with the aid of diagrams, showed the probable process of changing from a typical Pierid to one closely mimicking a *Heliconius*, dealing with many of the difficulties of the theory of mimicry, and advancing probable explanations.

February 4th.—*Annual Meeting.*—Mr. S. T. Bethune-Baker, Vice-President, in the chair. The annual reports of the Council, the Treasurer, and the Librarian, were presented; and the officers for the ensuing year were elected as follows:—President, Mr. G. H. Kenrick, F.E.S.; Vice-President, Mr. S. T. Bethune-Baker, F.L.S., F.E.S.; Treasurer, Mr. R. C. Bradley; Librarian, Mr. A. H. Martineau; Secretary, Mr. Colbran J. Wainwright, 147, Hall Road, Handsworth, Birmingham; and other members of the Council, Messrs. P. W. Abbott and W. Harrison. Mr. P. W. Abbott exhibited *Vanessa polychloros*, bred specimens, one of which was unusually pale, the border showing a good deal of yellow, and several unusual yellow blotches on the disk.—Colbran J. Wainwright, *Hon. Sec.*

Lancashire and Cheshire Entomological Society.—*January 14th*, 1895.—*Annual Meeting.*—Mr. S. J. Capper, F.L.S., F.E.S., President, in the chair. The election of Officers resulted in the re-election of Mr. Capper, President; Mr. Stott, Treasurer; and Mr. Locke, Librarian. Mr. W. E. Sharp was elected Vice-President, and the Rev. R. Freeman, Dr. Ellis, and Messrs. Jones, Gardner, and Wilding were elected for the Council. Mr. Locke was elected Secretary, but on his declining the office, Mr. Pierce agreed to continue acting *pro tem.* The President, in thanking the members for his re-election, spoke of the prosperous state the Society was in, and alluded to the death of one of the earliest helpers of the Society, Dr. Buchanan White. The balance-sheet showed, for the first time for a number of years, a balance on the right side, there being £1 12s. 1d. in hand. Dr. Forbes, Curator of the Derby Museum, Liverpool, was elected an honorary member of the Society. Mr. J. W. Tutt, of London, read a paper entitled "Some Random Notes on the Romanes Lecture of 1894, entitled 'The Effect of External Influences upon Development,'" in which he criticised the remarks of Professor Weismann on the resting state of insects as exhibited in the phenomena of hybernation and æstivation, and showed the points in which he differed from the Professor. The second part of the paper treated of the colour-variation of insects considered biologically. The President exhibited a number of Scotch *Zygæna exulans* and southern forms of *Polyommatus phlœas*. Mr. Tutt, a number of Zygænas from the Alps and other localities. Mr. Roxburg, *Polia nigrocincta* from the Isle of Man.

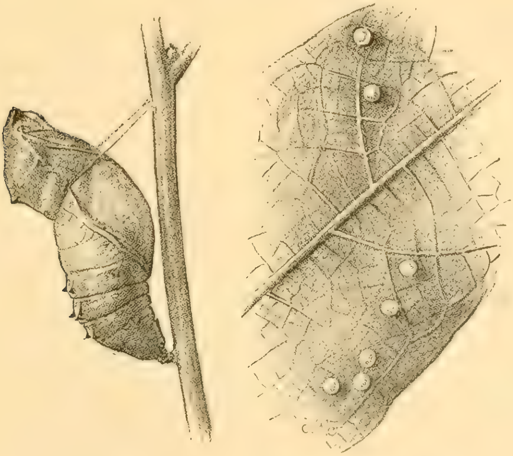
February 11th.—The President in the chair. Messrs. D. Walker, Herbert Massey, and Harold Milne were elected members. Dr. H. H. Corbett, of Doncaster, read "Remarks on some Varieties of Noctuina from Doncaster," in which he described a number of local forms occurring at Doncaster, illustrated by specimens, conspicuous among which were a fine series of melanic *Calocampa exoleta*, and a fine variety of *Asphalia flavicornis*, in which the dark transverse lines were very strongly marked. Mr. Mason exhibited a long series of *Caradrina ambigua* from Freshwater, a gynandromorphous specimen of *Argynnis paphia*, and a striking variety of *Agrotis agathina*, having the ground colour rosy. Mr. Sharp, a number of European Silphidæ, calling attention to the forms *brunnea* and *subrotundata* of *Silpha atrata.*—F. N. Pierce & A. B. Jones, *Hon. Secs.*

THE ENTOMOLOGIST

Vol. XXVIII.] APRIL, 1895. [No. 383.

LIFE-HISTORY OF *ORNITHOPTERA RICHMONDII.*

By Henry Schneider.



Pupa and Ova of *Ornithoptera richmondii.*

The caterpillar of *Ornithoptera richmondii* feeds on the *Aristolochia prævenosa,* a tall twiner found in northern New South Wales and southern Queensland. Except where otherwise specified the following description refers exclusively to the full-grown caterpillar:—

Colour usually drab, with a tinge of invisible green varying in different lights. The half-grown caterpillars, and frequently the old ones, are of a richer, deeper tint—a sort of velvety greenish brown.

The body is covered with a number of spines or processes of a soft yielding consistence. Some of them, in future spoken of as spines, are pointed like horns. The bases of these spines are of the same colour as the body. Then, at about the centre of its length, comes a narrow translucent band of yellow, and from thence to the point it is nearly black. Others, to be hereafter designated as caruncles, are much shorter, with a blunt yellow end, or with a black speck on the tip in addition. In other words, they are like the spines, only in a short abortive form. The spines are arranged systematically in three rows on each side of the body as follows:—Firstly, a dorsal row about an eighth of an inch from the centre of the back, and standing up more or less vertically; commencing on the second segment and ending on the twelfth, thus leaving an open space down the centre of the back about a quarter of an inch wide. Secondly, a lateral row of shorter spines, situated just below the spiracles, beginning on the first segment and ending on the eleventh; this row inclines slightly downward. The first, second, and third segments also carry a long spine each, intermediate in position between these two rows; and the fourth segment a short spine, or sometimes only a caruncle, in the same line and just above the spiracle.

When extended in forward motion the length of a full-grown caterpillar is from 2½ to 2¾ inches; but when at rest after a full meal, the anterior segments are bunched up together and the length averages about two inches. I cannot detect any odour, either from the body or from the greenish yellow horns when extruded.

The head is of a rich hazel-brown, or blackish and polished. The lateral jaws are very powerful, and as each mouthful is clipped out of the harsh leaf of the *Aristolochia*, a distinct "click" can be heard. The following detailed description applies, as above stated, to a full-grown caterpillar only:—

The first segment, behind the head, carries a pair of legs. Close above the leg is a short spine, the commencement of the lateral row. Above that again is a long spine projecting laterally, the commencement of the intermediate row of four. Immediately behind and above this spine, and in the crease between the first and second segments, is a depression or foramen. On the top of the back, and reaching from spine to spine, is a crescent-shaped, polished shield of the same colour as the head, in front of which, and close behind the head, is a yellowish lateral stripe, from which can be projected at will two greenish yellow fleshy horns about three-sixteenths of an inch high, cylindrical, truncated, curving slightly backwards, connected at the base, and diverging outwards so as to form an internal angle of sixty degrees.

The second and third segments have each a pair of legs. Above them a pair of yellow-tipped caruncles. Above again, a pair of short lateral spines inclined downward. Above again, a pair of long spines (about three-sixteenths of an inch) inclined upward, forward, and outward. Lastly, the uppermost or dorsal pair of spines nearly vertical. Height about an eighth of an inch.

Fourth segment.—A pair of yellow caruncles in place of legs. Above these another pair of yellow caruncles. Above again, the lateral spines. Then a pair of spiracles. Above them another pair of short spines, the last of the intermediate row. Lastly, the dorsal spines nearly vertical.

Fifth segment.—Pair of yellow caruncles in place of legs. Above them another pair. Again above, the lateral spines. Then spiracles, and lastly the dorsal spines, inclined a little outwards.

Sixth segment.—Pair of claspers. Two pairs of caruncles, one above another. Spiracles. Dorsal spines inclined slightly outwards.

Seventh segment.—Pair of claspers. Pair of yellow caruncles immediately above claspers. A little higher and to the front of claspers, the lateral spines. Spiracles. Dorsal spines inclining a little outward. N.B.—In this pair of spines the band of yellow is broader than in any of the others.

Eighth segment.—Same as seventh, except as to colour of dorsal spines.

Ninth segment.—Same as eighth.

Tenth segment.—Lateral spines. Last pair of spiracles. Dorsal spines, with increased outward and slightly backward incline.

Eleventh segment.—Pair of lateral spines, and dorsal pair inclining outward and backward.

Twelfth segment.—A single pair of spines belonging to the dorsal row, a quarter-inch long, projecting laterally, with slight upward and strong backward incline. Below these is the anal aperture, with a yellow caruncle on each side, and the last pair of claspers below.

The egg, when recently laid, is of a pale ochre-colour, and as the time approaches for the young caterpillar to emerge, changes to a muddy brownish yellow. It is deposited on the under side of the leaf, and is so soft when laid that it flattens against it, and is very firmly glued on. When first the young caterpillars leave the egg they are of a brownish claret-colour, with the head black. All the spines, with the exception of the dorsal pair on the seventh segment, which are yellow at the base, are of the colour of the body for the first half of their length ; the remaining half is black and covered with fine transverse spines branching in every direction. When about a third of an inch long they change their skin, the transverse spines disappear, and the dorsal pair of spines on the seventh segment are a bright yellow for nearly the whole of their length. The yellow bands on the other spines do not make their appearance till later. Up to the time when the caterpillars are an inch or more in length, this pair of yellow spines is a conspicuous feature. It is remarkable that the pair of fleshy horns that can be extruded behind the head are proportionately very much longer in the young caterpillars.

When preparing for the chrysalis stage, the caterpillar first secures the leaf to the twig on which it grows with a quantity of brown silk. Next it spreads a patch of the same material on the leaf below, in order to give a secure hold to its hind claspers. Then having placed itself in position with its tail on this patch, it proceeds to fix a thread to the leaf on one side of its body; then letting go with its legs and also the first pair of claspers, it rears itself up at right angles to the leaf, and throwing its head back, it protrudes the second and third pairs of legs; then passing its head across to the other side, it lodges the thread between the first and second pair of legs, and as the head descends again to the leaf on the other side, the disengaged portion of its body is bulged out in the opposite direction, carrying the thread with it. When the head reaches the leaf, the thread is glued either to the spot from which it started, or a little to one side of it. The thread having been made fast, the head is gradually raised again, and the whole manœuvre gone through in the opposite direction. The new thread is guided by one or other of the first pair of legs and so kept parallel with and touching the loop just made. This process is repeated backwards and forwards, the loop being kept taut all the time by the bulging of the body, until it is sufficiently strong. When complete the head is pushed under the slack loop, which is gradually worked backward until it is arranged to lie in the groove between the fifth and sixth segments, counting from the head. In about twenty-four hours' time he lets go with everything except the hind claspers, and lies back in the loop. About the third day the skin is ready for sloughing. When this operation has begun, if the caterpillar be attentively watched, it will be seen that every half-minute or so he gives a slight upward jerk of the head, followed by an undulating movement passing down the body to the tail. After this has gone on for about a couple of hours, it will be noticeable that the skin, especially the upper part of it, is getting so thin that the yellow colour of the chrysalis can be distinctly seen through it, whilst a wrinkled mass of the integument has collected round the point where the tail is attached. About this time the skin begins to split on the second segment. The movements of the body now go on almost without intermission, and the opening rapidly widens, till the split extends down the centre of the back, from the head to a little below the loop. Meanwhile the skin goes on steadily sliding down, and accumulating beneath the tail. The reason the skin does not give way will be seen by examining the shrivelled slough immediately after it is cast off, when it will be found to be so firmly glued together by the adhesive nature of its inner surface that it can be only very slightly extended without tearing. When the end of the slit is reached, the tail of the chrysalis gradually emerges and creeps round the accumulated skin, holding on to it all the time, and forcing its way under it till it finally dislodges the empty claspers from their hold and fastens itself at exactly the same spot. The chrysalis next screws itself forcibly round from side to side, until by the twisting of its body, the slough, which is now simply lodged between the tail and the leaf, is presently pushed out on one side or the other and falls to the ground. This having been effected, the body is hunched up, and a little jerk causes the loop to slip so far towards the head end, that any one, not having seen it before, would suppose it to be the result of an unfortunate accident. Such, however, is not the case, and the twisting motion is again continued, causing the silken loop to bury itself in the soft and yielding substance of the body. The chrysalis is now a misshapen-looking greenish yellow object, but in the course of a few hours the upper parts, and especially the wings, develop in a wonderful manner, and assume their permanent character. In about twenty-four hours the colour will have changed to a vivid green, unless indeed the chrysalis is formed in a box or ill-lighted.room, when the green permanently retains somewhat of a yellowish hue.

In the natural state, I have invariably found the chrysalis affixed to the back of a leaf, and never once on the food-plant. The caterpillars appear to prefer a rough-leaved plant, such as the bramble, lantana, &c., probably as affording a better hold to the silk.

[The ovum of *Ornithoptera richmondii* is globular, with the base flattened and sunken in the centre; it is wider than high, measuring one-eleventh of an inch in diameter and one-fourteenth of an inch in height; the surface is slightly granular.—F. W. F.]

ANTS AND THEIR COMPANIONS.

By C. W. Dale, F.E.S.

Ants have been known ever since the days of Solomon as being a little people but extremely wise. They were accredited by the ancients with carrying on harvesting operations, which have since been discredited, but have been proved to be fully correct by the researches of Moggridge in the South of France, Forel, and others. They resemble the lords of creation in another particular, that of keeping slaves and pets, and that is what I am going to draw special attention to.

In the 'Entomologist's Annual' for 1857, Mr. Janson draws special attention to the Myrmecophilous Coleoptera, or ants'-nest beetles of Britain, with instructions for obtaining them, and giving a list of thirty-six species. In the following 'Annual' he gives further notes, and states that ants' nests have contributed, within two years, upwards of twenty species of Coleoptera previously unknown as inhabitants of Britain, and have, moreover, yielded, in comparative plenty, no trifling number which were previously unique, or of the greatest rarity in collections. He also finds fault with certain individuals for ruthlessly destroying the nests, and commends the ants to his readers' sympathy.

Since 1858 the list of British Myrmecophilous Coleoptera has been largely added to, as may be seen by reading through the Rev. Canon Fowler's 'Coleoptera of the British Isles.' There are, moreover, various species of Aphides and Coccidæ attached to ants' nests, with a small sprinkling of others belonging to the Psoci, Phoridæ, and Tineidæ, families of the Neuroptera, Diptera, and Lepidoptera; whilst the Thysanura, Acari, and Onisci have also representatives.

Formica sanguinea, Latr.—This is, *par excellence*, the slave-making ant of our British species. It is local, being found chiefly in the sandy districts of Surrey. In the 'Entomologist's Annual' for 1868 Mr. F. Smith gives a list of nine other species of ants found in a nest of *F. sanguinea* on Shirley Common by Mr. Rothney. *F. fusca*, common; *F. nigra* and *flava*, several specimens; *Tapinoma erratica*, *Myrmica ruginodis*, and *M. scabrinodis*, common; *M. lobicornis*, workers very abundant, but only one female; *Leptothorax acervorum*, all the sexes abundant in August; *L. nylanderi*, several specimens. I can find only two species of Coleoptera recorded as being found in the nest of this ant, viz., *Dinarda maerkeli*, Fries, taken by Messrs. Douglas and Scott near Croydon; and *Hetærius sesquicornis*, Preys.

Formica rufa, L.—In the nests of this species another ant, *Stenamma westwoodii*, seems only to occur. The species of Coleoptera are numerous:—*Aleochara ruficornis*, Grav.; *Oxypoda recondita*, Ter.; *O. formiceticola*, Maerk.; *O. hæmorrhoa*, Mann; *Thiasophila angulata*, Er.; *Dinarda maerkeli*, Fries; *Myrmedonia humeralis*, Grav.; *Notothecta flavipes*, Grav.; *N. anceps*, Er.; *Quedius brevis*, Er.; *Leptacinus formicetorum*, Maerk.; *Dendrophilus pygmæus*, Lin.; *Myrmetes piceus*, Payk.; *Monotoma conicollis*, Aubé; *M. formicetorum*, Thoms.; *Ptenidium formicetorum*, Ter.; *Ptilium myrmecophilum*, All.; *Euplectus signatus*, Reich.; *Batrisus venustus*, Reich.; *Scydmænus godarti*, Latr.; *Neurophes longicollis*, Mots.; *Cetonia ænea*, Gyll. (larvæ); *Clythra quadripunctata* (larvæ); *C. tridentata*, Lin. (larvæ); *Coccinella labilis*, Muls. The following Homoptera occur:—*Paracletus cimiciformis*, Heyd.; *Forda formicaria*, Heyd.; *Trama troglodytes*, Heyd. Also one species of Hemiptera: *Piestostethus formicetorum*, Boh.; and one species of Lepidoptera: *Tinea ochraceella*, Tr.

FORMICA FULIGINOSA, L.—The following Coleoptera have been seen in nests of this species:—*Homœusa acuminata*, Maerk.; *Oxypoda longipes*, Mul.; *O. vittata*, Maerk.; *Thiasophila inquilina*, Maerk.; *Myrmedonia haworthi*, Steph.; *M. cognata*, Maerk.; *M. lugens*, Grav.; *M. laticollis*, Maerk.; *Notothecta confusa*, Maerk.; *Quedius brevis*, Er.; *Othius myrmecophilus*, Fries; *Dendrophilus punctatus*, Er.; *Ptenidium turgidum*, Thoms.; *P. formicetorum*, Ter.; *P. gresneri*, Er.; *Batrisus venustus*, Reich.; *Amphotis marginata*, Er. The following species of Homoptera occurs:—*Forda viridana*, Buck.; and of Neuroptera, *Atropos formicaria*, Hagen.

FORMICA FUSCA, L.—In the nests of this species occur the following Coleoptera:—*Homœusa acuminata*, Maerk.; *Aleochara ruficornis*, Grav.; *Dinarda dentata*, Grav.; *Artemeles emarginatus*, Grav.; *A. paradoxus*, Grav.; *Myrmedonia limbata*, Payk.; *Hetærius sesquicornis*, Preys.; *Ptenidium kraatzii*, Mitt.; also one species of the Thysanura, *Bechia albinos*, Nic.

FORMICA NIGRA, L.—Only two species of Coleoptera have been found in the nests of this species:—*Astilbus caniculatus*, Fab., and *Claviger testaceus*, Preys. The following Homoptera occur:—*Trama troglodytes*, Heyd.; *Paracletus cimiciformis*, Heyd.; *Forda formicaria*, Heyd.; *Endeis carnosa*, Buck.; *Ripersia subterranea*, Newst.; and *Lecanopsis formicarum*, Newst. One species of the Thysanura also occurs: *Bechia albinos*, N.; and one of the Onisci: *Platyarthrus hoffmanseggii*.

FORMICA FLAVA, L.—The following Coleoptera occur in the nests of this species, under stones:—*Astilbus caniculatus*, Fab.; *Medon bicolor*, Ol.; *Oxypoda hæmorrhoa*, Sahl.; *Claviger testaceus*, Preys.; *Bythinus glabratus*, Rye; *Trichonyx maerkelii*, Aubé. Of Homoptera there are ten species:—*Trama troglodytes*, Heyd.; *Paracletus cimiciformis*, Heyd.; *Forda formicaria*, Heyd.; *Tychea trivialis*, Pass.; *T. setulosa*, Pass.; *T. setariæ*, Pass.; *Endeis formicina*, Buck.; *E. pellucida*, Buck.; *E. carnosa*, Buck.; *Ripersia subterranea*, Buck. One species of Diptera also occurs: *Phora formicarum*, Nees.; one species of the Thysanura: *Bechia albinos*, Nic.; one of the Onisci: *Platyarthrus hoffmanseggii*; also one or two unknown species of Acari.

TAPINOMA ERRATICA, Latr.—In a nest of this species at Bournemouth has been found *Myrmedonia plicata*, Er.

MYRMICA RUGINODIS, Nyl.—The following Coleoptera occur in the nests of this species:—*Astilbus caniculatus*, Fab.; *Myrmedonia collaris*, Payk.; *Medon bicolor*, Er.; *Bryaxis hæmatica*, Erich.

TETRAMORIUM CÆSPITUM, L.—In the nests of this species a very remarkable species of ant, *Anergates atratula*, Sch., sometimes occurs. This is the one standing in Curtis's 'Guide' as *Myrmica maculipes*, Curt. It was taken by my father at Charmouth as far back as July 8th, 1835. The following species of Homoptera occur in the nests of this species:—*Ripersia tomlinii*, Newst.; and of Coleoptera, *Tychus glabratus*, Rye, and *Trichonyx maerkellii*, Aubé.

From the foregoing lists it will be seen that the following number of species inhabit ants' nests:—Coleoptera, 54; Lepidoptera, 1; Neuroptera, 1; Hemiptera, 1; Homoptera, 12; Diptera, 1; Thysanura, 1; Acari, 3; Onisci, 1; total, 75 species.

THREE NEW SPECIES OF COCCIDÆ.

By T. D. A. Cockerell,

Entomologist of the New Mexico (U.S.A.) Agricultural Experiment Station.

Ceroplastes iheringi, sp. nov.

Waxy scale greenish white, very irregular, nodose, without distinct plates. Length 4, breadth 4, height 3 mm. Female with the wax removed, 3 mm. long, 2 broad, dark olive-brown. Posterior cleft nearly 1 mm. long. Caudal spine distinct, but very short and broad. Dorsal and lateral projections ill-developed. When boiled in soda, the female produces a strong madder-red colour. Legs yellowish; femur stout; tarsus and tibia of equal length, or tibia a little longer. Claw moderate, curved. Digitules of claw very remarkable, brown, darker than leg or claw, long, extending considerably beyond tip of claw, stout, sub-bulbous at base, with very large round knobs. Tarsal digitules slender, with large brown knobs, but these not so large as those of the claw-digitules. Antennæ pale brownish, cylindrical, not or hardly tapering, distinctly 8-jointed; 3 and 4 about equal and longest; then 8 and 2 about equal; 5, 6, and 7 short and subequal, about as long as broad, 6 the shortest. Formula of antennæ (34) (821) (57) 6. Last joint suddenly narrowed before its middle, and bearing several hairs.

Hab. Rio Grande do Sul, Brazil; on *Baccharis platensis*, Griset. Collected by Dr. H. von Ihering. *Baccharis* is a genus of Compositæ of the tribe Asteroideæ.

Dr. von Ihering sent the specimens in alcohol; but at the same time sent dry specimens of the same species, also on *Baccharis* (species not stated), from Sao Paulo, Brazil. These latter specimens show two lines of white secretion on each side; they also show the spine or "tail" larger, though still very stout. The two localities for the species are about 600 miles apart.

Allied to *C. ceriferus* and *C. fairmairei* (which Maskell considers a synonym of *ceriferus*), but distinguished readily by its comparatively small size, its 8-jointed antennæ, and the details of the feet.

KERMES GILLETTEI, sp. nov.

Scale of female 8 mm. long, 7½ broad, 7 high. Distinctly segmented; dorsum with rounded tuberosities, not very shiny. Scale covered with minute dark brown specks. General colour ivory-white and dark brown mottled, the extent of the white or the brown variable, but usually a distinct white dorsal band, and more or less broken-up subdorsal ones. Derm by transmitted light reddish brown, with large oval gland-pits. Young larva very elongate, subfusiform, with the greatest breadth anterior to the middle; pale purplish pink. Caudal tubercles large and broad, each presenting two stout bristles, of which the inner (mesad) one is much the shortest. There is also a moderately long bristle on the outer side of each tubercle, near its base. Segmentation distinct; each segment with a short spine or bristle on lateral margin. Antennæ cylindrical, hardly at all tapering, 6-jointed; 3 and 6 equal and longest; 4 and 5 equal and shortest, these being about as long as broad; 2 very little longer than 4, and very much shorter than 3; 3 almost as long as 4 + 5. Last joint rounded at the tip, bearing several hairs. Antennæ colourless. Rostral loop extending beyond base of 3rd pair of legs. Mentum at least 2-jointed. Legs quite ordinary. Claw long, sharp, and a little curved. Tibia short.

Hab. Manitou, Colorado, U. S. A., on twigs of *Quercus undulata*. Collected by Prof. C. P. Gillette. Very distinct from *K. galliformis*, Riley, the only *Kermes* hitherto described from North America. Its nearest ally is evidently *Kermes gibbosus*, Signoret, which was found on oaks near Vienna.

The larvæ described above were found inside the scale of the female.

PHYSOKERMES COLORADENSIS, sp. nov.

Female scale with the same general shape as *P. abietis*, and attached in the same way to the twigs. Diam. 7 mm., smooth, shiny, rather pale brown, inflated, subreniform, with a median constriction. Derm yellowish brown, reticulate, the reticulations hexagonal. Large gland-pits looking like perforations. Mouth-parts small, rostral loop short. Legs not to be found, apparently absent in the adult. Antennæ small, 6-jointed, but the joints obscure. Last joint with several hairs. Joints subequal, except 2 and 5, which are shorter; 2 shortest, bearing a long hair; 4 perhaps a very little longer than 3, and longest; 5 constricted, simulating 2 joints, the second of them shortest.

Hab. Manitou, Colorado, Nov. 26th, 1894, on *Pinus edulis*. Collected by Prof. C. P. Gillette. It is attacked by a brownish Chalcidid parasite.

From the European *P. abietis* it is distinguished by its size and by the antennæ. No species of the genus has hitherto been found in America.

Las Cruces, New Mexico, Dec. 21st, 1894.

ON THE CAUSES OF VARIATION AND ABERRATION IN THE IMAGO STAGE OF BUTTERFLIES, WITH SUGGESTIONS ON THE ESTABLISHMENT OF NEW SPECIES.

By Dr. M. Standfuss, Lecturer in both Academies at Zürich. Translated by F. A. Dixey, M.A., M.D., Fellow of Wadham College, Oxford.

(Continued from p. 76.)

III. The Pupa.

Degrees of temperature and of humidity are in this case the only influencing conditions as to which anything can be said. Nevertheless the very numerous experiments which I have for some years conducted on the pupæ of a series of species, and moreover on large numbers of individuals of each species, with regard to the influence of varying temperature, have led to most remarkable results. I can truly say that during the period of more than twenty-five years which I have devoted to practical biological studies in entomology, I have never had before me anything approaching the astonishing results to which I am now referring. Can it be called anything but astonishing that it should be possible, by means of a simple experiment, to make larvæ of *P. machaon*, collected near Zürich, develop into a form of the perfect insect such as that which flies in August in Syria, perhaps near Antioch and Jerusalem? Or that from German and Swiss pupæ of *Vanessa antiopa*, L., by the action of well-defined factors, there should be produced an imago which in part comes very near to the Mexican *V. cyanomelas*, Doubl. Hew.? Or to force at will the one half of the progeny of one and the same female *V. cardui*, L., to develop into a form of the perfect insect almost identical with that occurring in the German possessions in Africa, and the other half to assume an aspect like that of *V. cardui* at the northernmost limit of its range, for instance, in Lapland? And apart from these glimpses into the causes of the variation of species, and into the nature of the species as such, a vista also opens out of the very relations of affinity, of the conditions of phylogeny, and of the derivation of one species from another.

In the collection of my father, who left me ten years ago all he had in the way of Lepidoptera, I possess a pair of *V.* ab. *porima*, O., the intermediate form between *V. levana*, L., and *V. prorsa*, L., labelled "Magdeburg, 1852; pupæ kept in cellar." The fundamental idea of the following experiments is therefore substantially forty years old, even if a still earlier date should not be forthcoming from some other quarter. I know of no publication on this subject reaching back so far as the fifties.

First in 1864, Georg Dorfmeister published, in the 'Mittheil. d. Naturwiss. Vereins für Steiermark,' a memoir "On the Influence of varying Degrees of Temperature, applied during the Period of Development, on the Colouring and Marking of Butterflies." This was followed, in 1880, by another memoir of Dorfmeister, "On the Influence of Temperature on the production of Variation in Butterflies" (Graz, 1880).

The best treatise on the subject has been published by Weismann, *viz.*, 'Ueber den Saison-Dimorphismus der Schmetterlinge'* (Leipzig, 1875).

Amongst additional literature on the same question may here be mentioned:—W. H. Edwards, "An Abstract of Dr. Aug. Weismann's Paper on Seasonal Dimorphism of Butterflies, to which is appended a Statement of some Experiments made upon *Papilio ajax*" ('Canadian Entomologist,' 1875, No. 7, pp. 228—240). G. Stange, "Experiments with a lowered Temperature on *Agrotis pronuba*, L., and *Cidaria tristata*, L." (Stettin. Entom. Zeit. 1886, p. 279). C. Ed. Venus, in 'Iris' (Dresden, 1888, pp. 209, 210). (*V. urticæ* was exposed to intense sunlight in the larval and pupal condition.)

All the above-mentioned treatises deal with the modifications produced by the action of certain degrees of temperature, applied during the pupal stage, on the aspect of the resulting imago, in the light of the species by itself—considered, that is, as a separate entity—without reference to its affinities with other species; and, indeed, the greater number of species hitherto subjected to these experiments have not been forms calculated to open up a further vista of phylogeny.

We will, however, let the present experiments, with their results, speak for themselves. They were conducted in the following manner:—

(1) Those pupæ only were used whose larvæ had fed up at the normal temperature of a room from the middle of May to the middle of August.

(2) The pupæ were taken for experiment as soon as they appeared perfectly formed and hardened; when they had lost, that is, the peculiar greasy gloss of most species in a perfectly fresh condition.†

(3) Most use was made of such species as live in societies, and can therefore be obtained in large broods. In this manner large groups of individuals derived from the same parents, and so bringing to the experiment approximately the same family characteristics, were employed almost throughout.

(4) One portion of each brood was put into a refrigerator, the temperature of which varied between 5° and 8° C. (41°—47° F.).

---

* Translated and edited in English by Professor Meldola.

† Quite fresh pupæ are not suited for experiments that involve a lowered temperature.

Inasmuch as at this temperature not one of the species examined developed the perfect insect, it would have been theoretically possible to vary the period of exposure at pleasure; the practical result, however, showed that in the case of most species employed the possible duration of exposure had well-defined limits.

A second portion of each brood was allowed to develop the perfect insects at the normal temperature of the room; a careful control-experiment seeming to be desirable.

A third portion underwent development at a raised temperature. I must here offer my special thanks to Dr. Stebler, Director of the Agricultural Laboratory of the Federal Polytechnicum, for not only placing some of the apparatus of the Station at my unconditional disposal, but also for having it especially prepared for my object. The apparatus made use of by me, the temperature of which was very easily regulated, was fitted with glass doors, which enabled the light to enter freely.

Let us now turn to the most essential features of the results obtained in the case of those species which were subjected to experiment in large or at least considerable numbers.

1. *P. machaon*, L. (Larvæ from Zürich.)

a. Warmth.

From 17 pupæ kept at 37° C. (98°—99° F.), I obtained, in 7—10 days, 15 well-developed perfect insects. *Upper surface.*—The general colouring is much lighter than in the normal second brood in this locality, in consequence of a strong yellow powdering of the black patch at the base of the fore wings, of the toothed outer band, and of the four first ribs reckoned from the dorsal border.* The blue band of the hind wing is further removed from the margin, and in 50 per cent. of the specimens one or two of its projections reach the black arch that closes the central cell; this being otherwise exclusively characteristic of forms of much more southerly origin. The fore wing is strongly curved, the hind wing has its outer margin deeply indented between the ribs, and is furnished with a conspicuously elongated tail (with an expansion of 76 millim. the tail measures 10 millim.). Our Zürich summer form has, with the same expansion, a tail only two-thirds as long. With this conspicuous modification in the form of the wing is evidently connected the enlargement of the yellow marginal crescents on the outer border. The abdomen assumes a prevailing yellow tint, the black lateral lines becoming much reduced throughout, and in two examples being entirely obliterated by a yellow powdering. In the same way the black stripe on the back of the abdomen is more or less lost, in two specimens almost entirely so. The thorax also is rendered much lighter in colour by an increase in the number of yellow scales.

---

* N.B.—The "dorsal" border in Dr. Standfuss's paper=what is usually called in this country the "inner" or "posterior" border.

Under side. In correspondence with the modification of the upper side, much of the black marking is obliterated by yellow scales. In two specimens, for example, the black marginal line has completely disappeared, with the exception of a few black scales constituting a scarcely perceptible relic.

Some of these specimens, as already remarked, bear a perfect resemblance to those that fly in August in the neighbourhood of Antioch and Jerusalem.

b. Cold.

One portion of the pupæ, consisting of 24 specimens, which were kept for 28 days in the refrigerator, yielded only two specimens. These resemble the Swiss and German form of *P. machaon*, L., from hybernated pupæ.

With regard to *Apatura iris*, L., *A. ilia*, Schiff, and *Limenitis camilla*, Schiff, the material subjected to experiment was not sufficient to give any certain conclusion.

2. *Vanessa c-album.*

a. Warmth.

This species also, like *P. machaon*, L., whether at a raised or a lowered temperature, gave rise only to forms such as those occurring on the earth at the present time. Pupæ kept at 37° C. (98°—99° F.) gave origin, after 6—8 days, to the light-coloured, yellowish-brown form of the butterfly, especially pale on the under surface, with less sharply defined markings and less deeply indented margins to the wings.

b. Cold.

Pupæ kept on the ice for 28 days produced, after 7—10 days more, the form with much more sharply defined markings, a considerably darker under side, in many cases mingled with moss-green tints, and a more deeply indented margin to the wings.

An exact comparison of the measurement of the wings makes it extremely probable that the modified shape of the wings in the "warmed" form of *P. machaon*, L., arises from the fact that certain of the nervures are much elongated as compared with the "cooled" form; whereas the more deeply indented margin of the "cooled" form of *V. c-album* is due to arrested development of certain parts of the wing, especially the intercostal portions.

3. *V. polychloros*, L.

a. Warmth.

Five days at 37° C. (98°—99° F.), then at 25° C. up to the emergence of the butterflies on the 9th—12th day. The result was a reduction of the blue marginal spots of the hind wing and of the dark outer border of the fore wing. There was also a brightening of the wings by an increased paleness of the brown ground colour, and by a multiplication of yellow scales between the black spots of the costal margin of the fore wing and on the outer border of the black spot at the root of the hind wing.

The under side of both wings was rendered more uniform in colour by the fact that, while the outer portion became darker, the basal portion remained of almost the same colour.

b. Cold.

(1) After a 14-days' sojourn of the pupæ on ice, the butterflies appeared in the room in 7—10 days longer.

The brown ground colour becomes darker, the blue marginal spots of the hind wing larger and brighter, the dark outer border of the fore wing broader; three ill-defined blue spots appear in the middle of the outer border.

On the under side the contrast between the basal and external portions of the wing is enhanced by the increased lightness of the latter.

(2) After 28 days of exposure to cold the butterflies emerged at the ordinary temperature of the room in 9—12 days more.

These showed all the divergent characters above described in increased measure—the much broader and darker outer border of the fore wing, with its distinct blue spots, making this a far more showy insect than the normal form.

Besides this, the spot lying nearest to the root of the wing on the dorsal margin of the fore wing in these specimens often disappears, as also, in rare cases, the spot lying nearer to the outer margin; moreover, there are sometimes indications of the disintegration of the double spot in the middle of the fore wing.

On the under side the tint of the outer portion of the wings mostly becomes lighter; in one specimen it may even be called a dingy sulphur-yellow.

(3) After 42 days' exposure upon ice only 20 per cent. of the pupæ, 13—16 days afterwards, yielded well-developed butterflies. These are for the most part normal in the fore wings; in two cases, however, the four spots lying nearest to the dorsal margin are more or less wanting, whilst on the hind wing the black basal patch is markedly or entirely deficient; and in the same way the blue marginal spots have more or less completely vanished, their places being taken by very small sharply defined black triangles. On the under side of both wings the well-marked lightening of the colour of the outer portion disappears, being replaced in almost all instances by a very peculiar tinge of reddish brown.

4. *V. urticæ*, L.

a. Warmth.

Pupæ kept for 60 hours at 37° C. (98°—99° F.) yielded butterflies at the temperature of the room in 80—100 hours after.

The blue spots on the outer margin, especially of the fore wing, disappear, as also do more or less the pair of spots in the middle of the fore wing.

The black spot on the dorsal margin becomes at least much smaller; in one specimen it has all but gone. Moreover, the black basal patch on the hind wing is substantially lessened in extent. The under side of both wings is conspicuously darker.

To speak briefly, these points indicate an approach to var. *ichnusa*, Bon., which form indeed would be produced in its typical aspect if all the characteristics mentioned were united in one individual. Amongst the material so far before me, however, there is no such individual to be found. But all these characteristics indicate a certain approach of the ordinary type of *V. urticæ*, L., to *V. io*, L.

b. Cold.

Pupæ kept 32 days in the refrigerator gave the perfect insect after 9—10 more days in the room.

The blue on the outer border is much increased; the black spots on the costal margin and in the middle of the wing, and more particularly the spot on the dorsal margin, show an increase in size and depth of colouring. In one-fourth of the specimens obtained there appeared a black transverse shade between the largest costal spot and the spot on the dorsal margin, so that a third, and in many individuals almost one-half, of the fore wing seemed blackened from the base outwards.

These specimens, by the above-mentioned characters, strongly recall the North American *V. milberti*, Godt.; they are, however, readily distinguished by one handsome feature not possessed by *V. milberti*, viz., the specially strong development of the blue of the outer border, and the presence of blue streaks extending from the white costal spot to the apex of the fore wing. The under side of the hind wing is darker than in normal specimens, as are also the tip and basal portion of the fore wing.

Pupæ of *V. urticæ* kept upon ice for 42 days, and emerging in the room 13—14 days afterwards, lost all but a small relic of the beautiful blue spots on the outer border, and, so far as the black markings are concerned, show on the whole less deviation from the normal form than the specimens just described, which remained in the refrigerator as pupæ for 32 days. Many of these specimens are indistinguishable from the northern var. *polaris*.

5. *Vanessa io*, L.

a. Warmth.

Pupæ kept 72 hours at 37° C. (98°—99° F.) produced the perfect insects in 4 or 5 days afterwards. These were of the ordinary form with but slight modification.

The ground colour of the fore wings becomes of a darker reddish brown ; one portion of the blue on the apex of the wings is deficient, and the black ground colour here becomes evident.

On the hind wings the pale annulus surrounding the ocellus disappears from the outer margin, and the dark ground colour accordingly extends inwards. The under side of both fore and hind wing becomes darker and more uniform in tint, whilst nearly all the *Vanessa*-pattern, which is still indicated in the normal form, is lost.

b. Cold.

(1) Pupæ kept in the refrigerator 35 days produced the perfect insect in 12—14 days afterwards, in the room ; 25 per cent. of the butterflies were crippled. I have described this form in the present Journal for Dec. 1st, 1892, as *V. io*, ab. *fischeri*, and have in the same place already drawn attention to the fact that it is of especial interest as affording an insight into the way in which the derivation of *V. io* from *V. urticæ*, L., and its nearest relatives has taken place,—an insight, that is to say, into phylogenetic relations.

The chief characteristics of this form are: the reduction in number of the blue scales on both fore and hind wings, and the darker appearance of the outer margin in both wings.

Besides this there occur on the fore wings, at the junction of the outer border with the reddish brown ground colour, some small isolated groups of deep black scales, mingled with which appear a few detached blue scales.

The black costal patch lying close to the root of the wing undergoes a further extension inwards.

On the under side the pattern is much more sharply defined than in the normal, the elements of the pattern being largely marked out in brown scales.

All these characters of the pattern betoken an approach to the type of *V. urticæ*.

(2) In addition to these features there occurred others in the case of pupæ kept for 42 days in the refrigerator, the butterflies (of which only 10 per cent. were good specimens) emerging in the room from 14—18 days later. These were as follows :—

α. The ground colour of the wings showed a strong admixture of yellow.

β. In some individuals there appeared a black spot on the dorsal margin of the fore wing, in exactly the same place as the corresponding spot in *V. urticæ*.

γ. The ocellus on the hind wing was frequently much reduced, in some almost to the point of complete disappearance.

δ. The region which constitutes the middle of the ocellus at the apex of the fore wing acquired numerous black scales, thus resembling the corresponding black spot in *V. urticæ*.

ε. In a number of individuals the brown scales on the under side of both wings increased to such an extent that the character of *V. io* was in these instances entirely lost, and the under side acquired a much greater resemblance to that of *V. urticæ* or *V. polychloros*, L.

Besides these forms showing a transition to *V. urticæ*, L., a form was also produced exceptionally (properly therefore an aberration) which may occasionally be met with in nature. Its chief peculiarities are the enlargement of the black costal spot internal to the ocellus of the fore wing, the darkening of the inner part of that ocellus, and the disappearance of the ocellus from the hind wing.

6. *V. antiopa*, L.

A species which reacts to different degrees of temperature hardly less markedly than *V. io*, and on this account of the highest interest.

a. Warmth.

Pupæ exposed for 48 hours to 37° C. (98°—99° F.) yielded the perfect insects 10 days later in the room.

In these the blue of the outer margin seemed to be more or less reduced.

On the hind wing the yellow outer border, especially from the tail-like projection to the dorsal (anal) angle, is broader than in normal specimens, which leads to a displacement inwards of the blue and also of the ground colour of the wing.

On the fore wing the yellow reaches in a wavy or simply arched form up to the row of blue spots, in this manner more or less crowding them out. No very characteristic variation of aspect, however, from the typical form of the species occurs in these examples by the mere fact that the blue points undergo a very marked reduction, even to the size of a large pin's-head, as is the case in a series of my specimens, or even, as in a few individuals, to still smaller dimensions; for both the ground colour and the outer border scarcely differ in any appreciable degree from the normal colouring of the species.

The hind wing also shows no difference as compared with the type-form, except for the slight blackening of the margin.

But under the above-mentioned treatment of the pupæ of *V. antiopa* there arose among the specimens just described, in a few isolated instances only (about 2 per cent.), another divergent and very remarkable creature, which may accordingly be spoken of as a true "aberration." This I shall at once describe more minutely, as under another kind of treatment of the pupa the same form occurs constantly,—becoming, therefore, a true "variety."

Pupæ of *V. antiopa* exposed for 60 hours to a temperature of 37° C. (98°—99° F.), and then kept at 24° C. (75° F.), produced, 12 days after pupation, a butterfly which, among all the forms hitherto obtained by me in these experiments, departed most widely from the normal type. To this form I have given the name of *V. antiopa* var. *daubi*, Stdfs., in honour of my friend Daub, of Karlsruhe.

It is only the keen and intelligent interest in the scientific bearing of entomology, and the considerable pecuniary sacrifices which are brought by men like my valued friend Daub to the study of these favourites of theirs, that make the investigation—in many respects a thorny one—of this branch of zoology possible to the specialist.

On the upper surface of this very beautiful form the brown ground colour is darkened, especially on the hind wing, which sometimes seems almost black. The blue marginal points, reduced to about half their normal size, show a tinge of violet. But what impresses on this creature its strongly divergent character is the extraordinary darkening of the yellow border of both pairs of wings, which in the most extreme examples shows only a small remnant of the yellow scales.

Besides this the blackened border is seen on the fore wing to have a waved outline corresponding to the occurrence of the blue spots, whilst generally keeping on the hind wing to the normal form.

A remarkable feature in most of the specimens is the strongly excavated dorsal margin of the fore wing, a result of which is that the dorsal angle is markedly less than in normal examples. Besides this the outer border of both pairs of wings is drawn out into less projecting points than in the usual form.

On the *under side* this fine creature is as much darkened as on the upper surface.

The ground colour is an almost pure black shot with moirée; with the exception of the two white costal patches there are scarcely any markings to be seen; moreover, the outer border of both pairs of wings, by reason of its strong black colouring, presents scarcely any contrast of importance with the tint of the rest of the wing; some specimens, however, occur in which this contrast is sufficiently apparent.

These latter specimens are also darkened to a less degree on the upper surface, and they vividly recall the Mexican *V. cyanomelas*, Doubl. Hew.

b. Cold.

(1) 29—34 days in the refrigerator; then 12—13 days at the normal temperature.

Corresponding to the different amount of exposure there is a series of very diverse forms.

The brown ground colour becomes lighter in varying degrees, and the blue marginal spots, which in these cases become much enlarged on the fore wings only, each acquire separately an encircling black ring. In other words, the continuous black submarginal streak, which in the normal *V. antiopa* forms the boundary between the basal brown and the marginal yellow, and in which occur the groups of blue scales, is here resolved into isolated black wedge-shaped spots, the centres of which are embellished with blue.

Thus there appeared features like those shown at the present day by *V. urticæ*, L., *V. polychloros*, L., &c., on the upper surface of the hind wing.

Internally to the black wedge-shaped marks on both wings, and with especial distinctness below the yellowish wedge on the apex of the fore wing, are found yellowish scales like those that occur very plainly in certain cooled forms of *V. polychloros*.

Moreover, in a few individuals there appear, in the light brown area of the wing, two large dark spots just in the position of the two spots near the centre of the fore wing in *V. polychloros*, *V. urticæ*, &c.

Besides this, the spots on the costal margin, shown by *V. polychloros* and its nearest relatives, appear as dark markings in these lighter-coloured specimens of *V. antiopa*.

In correspondence with these features of the upper surface, the under side also, especially of the hind wing, exhibits a substantial approach to the type of the *polychloros* group; inasmuch as the details of the pattern which in *V. antiopa* are usually so confused stand out more clearly from the ground colour; being in these forms distinctly outlined with brown scales, quite similarly, in fact, to what has been described above in the cooled form of *V. io*.

(2) Thirty-nine days in the refrigerator, 14—16 at the normal temperature.

The most conspicuous features of this form are the increase of the blue and the narrowing of the yellow outer border of both pairs of wings. The brown ground colour is also somewhat darkened, more so on the hind wing than the fore wing, as compared with normal specimens. In a few specimens the blue of the hind wing not only reaches right up to the yellow border, but also intrudes into it in the form of more or less acute projections. This last form is of quite singular beauty.

The under side has the pale outer border similarly narrowed, and shows slight indications of an approach to the type of *V. polychloros*, &c., resulting, as in the case of the above-described form, from the arrangement of the brownish scales. In other respects, however, there is no marked deviation from the normal.

(3) Forty-four days in the refrigerator, 15—19 days at the normal temperature, 60 per cent. of the butterflies emerging in good condition.

Upper surface.—The yellow outer band becomes, as a rule, still further narrowed, and acquires a plentiful admixture of black scales.

The blue is everywhere considerably increased, and in the hind wing seems almost invariably to have acquired the tendency to intrude by angular projections into the yellow border. The ground colour of the hind wing becomes of a splendid velvety black; that of the fore wing is also very markedly darkened.

Under surface.—The pale border is here also correspondingly narrowed, and is thickly beset with black scales, especially towards the tip of the fore wing.

The remainder of the surface is deep black, and all the markings are very indistinct; moreover, the two white costal spots on the fore wing are considerably reduced in consequence of a powdering of black.

As far back as the autumn of 1893, I bestowed on this beautiful form the name of *V. antiopa* ab. *roederi*, Stdfs., after my valued friend Röder, of Wiesbaden. He, too, is one of the men who in these matter-of-fact times of ours have not lost their interest in these little masterpieces of Nature's handicraft.

7. *Vanessa atalanta*, L.

a. Warmth.

Seventy-two hours at 37° C. (98°—99° F.), then 3—4 days at 24° C. (75° F.) until the butterflies emerged.

Upper surface.—The outer marginal blue of the fore wing becomes so much reduced that in most individuals there only remain visible two small spots near the apex.

The red cross-band of the fore wing becomes widened to a greater or less extent; this in some individuals is carried to such a point at the costal margin that the black patch lying just internally to this region becomes completely annulated with red. This showy cross-band is also widened on the external aspect.

Besides this, there occurs an abundant reddish-brown shading on the black portion of the fore wing near the root.

The large white patch on the costal margin of the fore wing, and the five white spots lying in a curve externally to this, show an undoubted tendency towards reduction; in some individuals the fifth of these spots, that namely that lies close to the red band, vanishes altogether.

All these features approximate towards *V. callirrhoë*, F., and its local forms, var. *vulcania*, Godt., from the Canaries, &c.

The occasional enlargement of the black points in the red outer border of the hind wing must also be considered an approach [to these forms]. On the other hand, there is a further most remarkable characteristic of these specimens produced at a raised temperature which, from this point of view, is not easily explained; this is the occurrence, in about 50 per cent. of the individuals reared under the above-mentioned conditions, of a bright red powdering between the second and third of the five white spots near the apex of the fore wing already mentioned. This powdering is sometimes prolonged, following the course of the nervure that here traverses the wing, almost up to the large white costal patch.

This striking peculiarity, though in a less marked form, occurs also in one individual between the third and fourth of these five spots.

Under surface.—The most remarkable characteristic of the fore wing is again the widening of the red cross-band. Moreover, there occurs with some frequency a red spot in the black ground colour of the region of the wing adjacent to the dorsal border, in the exact situation where, in *V. callirrhoë*, the red area of the wing projects outwards.

The hind wings show but little departure from the normal condition; the triangular light spot about the middle of the costal margin is, however, in these warmed specimens, rendered less distinct by a powdering of dark scales.

b. Cold.

(1) Thirty-one days in the ice-box, then 8 days at normal temperature.

Here, as in the warmed specimens of *V. atalanta*, there is much individual variation.

The chief reason for this may be that in this species it is not possible to collect large broods from the same parents; the insects while being reared, even though much material of the same species is employed, are therefore not passing contemporaneously in large numbers through the same stages of development, for which reason it is almost impossible to subject a large proportion of individuals in quite the same stage of growth either to a raised or lowered temperature; moreover, quite apart from this consideration, the insects, derived as they are from many different stocks, interfere with the experiments by introducing a greater diversity of qualities than would be the case in large broods coming from the same parents.

Upper surface.—The white costal spot becomes enlarged; the red band of the fore wing is intersected in the middle by two black transverse shades, distant from each other about 1½ millimetres; the space between these transverse shades is at times almost completely filled in with black scales. In the same way the lowest part of the red cross-band, on the dorsal margin, usually becomes cut off by a black line which follows the course of the nervure that occurs here [*i.e.* the first median nervule].

In extreme cases the red patch thus cut off on the dorsal edge is almost obliterated by a black powdering. Blue scales are also found between the white costal patch and the red band, and in a few cases on the dorsal margin internally to the latter.

On the hind wing the black points in the red band on the outer margin diminish in size, and acquire, like the terminations of the nervures which lie within this band, a powdering of blue or yellowish scales. The blue spot on the anal angle assumes larger dimensions.

Under side.—The blue between the white costal patch and the red band of the fore wing becomes conspicuously increased.

The black transverse shades that intersect the red band, which becomes tinged with violet, are here also well marked. The hind wings assume a washed-out, confused pattern, and show throughout, but especially on the outer and anterior border, a well-marked lightening of colour, due to an abundant infusion of yellow and blue tints.

(2) Forty-two days in ice-box, the butterflies appearing at the normal temperature 12—14 days afterwards.

Twelve pupæ yielded ten almost normal perfect insects. One pupa succumbed to the conditions of the experiment.

The eleventh butterfly resembled the extremely abnormal forms already described; the white costal patch on the fore wing, however, instead of being enlarged, was slighter than in normal specimens.

(To be continued.)

AUSTRALIAN HEPIALIDÆ.

By A. Sidney Olliff,
Government Entomologist, New South Wales.

The brilliantly-coloured ghost-moths, so well known to every lepidopterist in Australia and New Zealand under the name *Charagia*, have been obtained in more than usual numbers during the past two seasons, a fact which it is no fancy to attribute in a large measure to the recent disastrous strikes in the Newcastle coal trade. The enforced idleness of many of the mines, and the consequent want of employment, have given much unwelcome leisure to the small band of miner-collectors on whom we chiefly depend for our supply of specimens, and they have not been slow to avail themselves of the opportunity to devote some of their time to collecting the wood-eating Lepidoptera which make their homes in the scrublands of the Lower Hunter River.

It is rarely that more than worn and solitary specimens of these giant ghost-moths are obtained by any but resident collectors, as they are very retiring and sluggish in their habits; but it is comparatively easy to breed the larvæ in captivity, provided that the wood in which they are living is not cut until they are nearly full-grown; and it is by leaving the game untouched, and returning to cut out the portion of wood containing the grub when the inmate has turned, or is about to turn, to the pupal stage, that the collector is best able to secure satisfactory results.

The size of the opening of the burrow, which is enlarged from time to time to meet the requirements of the rapidly growing larva, and the texture and the degree of dryness of the bag-like covering, formed of coarse silk and triturated wood and bark, with which it protects the entrance to this burrow, are characteristics that guide the experienced collector in deciding when the infested limb should be cut. If these limbs and their contents are kept in damp sand in a cool and airy place, a fair proportion of successful breedings may be counted upon, but it is no uncommon thing for the emergence of the moths to be delayed for one, or even two, seasons.

The large increase of attention lately bestowed upon the collecting and breeding of these attractive moths, has served to illustrate in the most forcible way their growing scarcity in the Hunter River districts, a scarcity that is directly due to the rapid disappearance of the scrub timber in the mining centres, and to the zealousness with which that now standing is guarded by the coalowners. Although considerable damage undoubtedly results to useful timbers and shrubs, such as black apple (*Achras australis*), native hop (*Dodonæa viscosa*), wattle (*Acacia decurrens*), grey gum (*Eucalyptus tereticornis*), and various other Eucalypts, from the attacks of these lignivorous caterpillars, I have found from personal experience that the average mine-manager is not to be persuaded that one is doing him a service by felling even unhealthy-looking saplings infested with these grubs. He rather inclines to the view that poor-looking timber is better than none at all.

The increasing rarity of these insects is emphasised by the almost complete absence of the larger and rarer species which occurred in fair numbers in former years when collectors were few. The vast bulk of the specimens now obtained belong to the most widely distributed species, *Charagia lignivora*, Lw., *C. splendens*, Sc., and *C. eximia*, Sc. The *C. lewini*, Walk., occurred more rarely, and the silver-spangled *C. ramsayi*, Sc., was only found once or twice, all the examples being females, and *C. scotti*, Sc. (W. S. Macleay MS.), only on a single occasion. The *Zelotypia stacyi*, Sc., or "Bentwing" of the miners, the largest of the Hepialidæ, and one of the largest known moths, was very scarce, and its variety *sinuosa*, Oll., did not occur once.

It is satisfactory to be able to add that the typical form of this magnificent moth has recently been found at Mt. Victoria, a summer resort in the Blue Mountains, 3422 feet above the sea-level. Besides the valley of the Hunter River, the only previously known locality for the species was the Manning River, ninety miles further north.

The following descriptions are from dry, and therefore faded, specimens. The vivid green and red of the living insects quickly fades after death, in many cases turning to brown, drab, and dusky red.

CHARAGIA CELSISSIMA, sp. n.

♀. Antennæ reddish brown, tapering towards the extremity. Head, thorax, and abdomen bright grass-green; the thorax brownish in front and at the sides; the abdomen much elongated, anal tufts inclining to reddish brown. Fore wing elongate, ample, bright grass-green, somewhat shining, the costa comparatively straight, the hind and inner margins conspicuously and moderately strongly bordered with dusky brown; the apical angle obtuse, the hinder angle strongly rounded, with two rather broad transverse shining whitish silvery markings towards the apex; the innermost just beyond the discoidal cell moderately broad, extending from vein two to vein ten, interrupted and inflexed at vein three and between veins 6—7; the outermost about midway between the innermost and the hind margin, narrower, parallel to the first, and extending from between veins 3—4 to between veins 8—9, broken into spots between veins 6—7, 7—8, and 8—10; both markings broadly outlined with dusky brown. Hind wing dusky salmon-colour, inclining to reddish brown at the base, apical angle obtusely rounded, hinder angle regularly and gradually rounded. Under side dusky salmon-colour, lighter towards the hind margin; obscurely barred with brown beyond basal third of costa. Expanse of wings, 145 mm.; length of body, 172 mm.

Port Darwin, N. Australia; a single female.

Allied to the West Australian *Charagia scripta*, Sc., but easily distinguished by its larger size, and less extensive, and very different markings.

CHARAGIA WALSINGHAMI, sp. n.

♀. Antennæ pale reddish brown. Head and thorax bright grass-green, the latter dusky brown at the sides; the abdomen very long, reddish at the extremity. Fore wing bright grass-green, with indistinct transverse wavy brown markings; costa, at the basal half, with five irregular broad dusky brown markings; a few small irregular dots on anterior and posterior margins of discoidal cell; irregular parallel series of transverse single linear markings and patches between veins 1—9; two conspicuous brown ovate patches just beyond discoidal cell, between veins 5—6 and 6—7. Hind wing pale pinkish salmon-colour. Under side pale salmon-colour, suffused externally with golden yellow; costa of fore wing obscurely barred with brown. Expanse of wings, 110 mm.; length of body, 67 mm.

Mt. Bartle Frere, Queensland; a single female specimen.

A distinct and beautiful species, with an abnormally long abdomen, most nearly approaching *Charagia eximia*, Sc. It is dedicated to Lord Walsingham.

CHARAGIA COREEBA, sp. n.

♀. Antennæ reddish brown. Head, thorax, and abdomen bright grass-green. Fore wing bright grass-green, with distinct irregular dusky brown markings; costa with five or six irregular brownish markings at intervals; an irregular W-like double brown marking just beyond the middle of the discoidal cell; a row of irregular transverse brown markings beyond the cell, parallel to the hind margin; of these one near the costa, at its basal five-sevenths, is a rectangular interruption of the two outermost costal markings, and another of the series is a double linear marking extending from veins 2—5, its inner outline interrupted at vein two; a row of double irregular markings between veins 4—9, near, and parallel to, the hind margin; another simple row of similar markings about the middle of the inner margin. Hind wing pinkish salmon-colour, pale golden yellow externally, veins at hind margin pale golden yellow. Under side pale salmon-colour, suffused with golden yellow externally; costa of fore wing obscurely barred with brown. Expanse of wings, 96 mm.; length of body, 45 mm.

Newcastle, Ash Island, Hunter River, New South Wales; two females.

Closely allied to *Charagia eximia*, Sc., and *C. scotti*, Sc., but readily recognisable by its more numerous and more diffused markings. It agrees with the female of the former species (described by me in Scott's 'Australian Lepidoptera,' vol. ii. p. 8, 1890) in outline, and does not possess the silvery spots beyond the discoidal cell of the fore wing which are so conspicuous in that species.

The name *Coreeba* is the aboriginal equivalent for Ash Island.

Charagia has recently been sunk in the old and extensive genus *Hepialus*, of which the typical species is *H. humuli*, Linn., and *Zelotypia* has been merged in the South African genus *Leto*; but I propose to retain both these groups, as I consider them to be convenient divisions affording characters of generic value; and for the same reason I also propose to retain *Trictena*, lately sunk in *Pielus*. In spite of recent revision, and still more recent cataloguing, the species of these latter genera and their immediate allies are in an extraordinary state of confusion; but I need say nothing further in regard to them here, as I am discussing their synonymy, and giving my views of the value of *Charagia*, *Zelotypia*, and *Trictena*, in another place.

Department of Agriculture, Sydney, December 17th, 1894.

A CATALOGUE OF THE MACRO-LEPIDOPTERA OF DERBYSHIRE.

By Fred. W. G. Payne.

(Continued from p. 52.)

Bryophila perla. Common.

Diphthera orion. Has been taken at Calke Abbey (J. Hill).

Demas coryli. Dovedale (G. Baker). Lathkil Dale (Rev. C. F. Thornewill and Rev. R. H. Fuller).

Acronycta tridens. Barrow (Rev. G. A. Smallwood).—*A. psi*. Common.—*A. leporina*. One near Willington (W. Garneys). Stapenhill (G. Baker).—*A. megacephala*. Fairly common.—*A. alni*. Common south.—*A. ligustri*. Repton Shrubs, rare.—*A. rumicis*. Common everywhere.

Diloba cæruleocephala. Common in the south.

Leucania conigera. Bretby and Barrow.—*L. lithargyria*. Bretby and Barrow.—*L. comma*. Common.—*L. impura*. Common.—*L. pallens*. Common.

Tapinostola fulva. Bretby and Chellaston.

Nonagria arundinis, Fb., =*typhæ*, Esp. Common south.—*N. lutosa*, Hb., =*crassicornis*, Haw., Sta. Willington.

Gortyna ochracea, Hb., =*flavago*, Esp. Fairly common.

Hydrœcia nictitans. Fairly common. — *H. micacea.* Bakewell, Barrow, and Bretby.

Axylia putris. Common in the south.

Xylophasia rurea. Common. — Var. *combustata.* Breadsall (Mr. Hill). Bakewell, casually (Rev. R. H. Fuller).—*X. lithoxylea.* Common. —*X. sublustris.* Willington.—*X. monoglypha*, Hufn., =*polyodon*, L. Common. Rev. R. H. Fuller has taken the dark form at Bakewell.—*X. hepatica.* Barrow and Bretby.—*X. scolopacina.* Bretby and Ingleby.

Neuria reticulata, Vill., =*saponariæ*, Bork. Repton Shrubs, Barrow, and Chellaston.

Neuronia popularis. Chellaston, Bretby, and Derby.

Charæas graminis. Common.

Cerigo matura, Hufn., =*cytherea*, Fb. Recorded once (Rev. R. H. Fuller). One at Barrow (Rev. G. A. Smallwood).

Luperina testacea. Fairly common.

Mamestra sordida, Bork., = *anceps*, Hb. Bretby and Barrow.—*M. furva.* Recorded as a Derbyshire insect by Newman.—*M. brassicæ.* Common.—*M. persicariæ.* Common south.

Apamea basilinea. Common.—*A. gemina.* Common everywhere.—*A. unanimis.* Recorded by Mr. Hill and Rev. G. A. Smallwood.—*A. didyma*, Esp., =*oculea*, Gn. Common everywhere.

Miana strigilis. Common.—*M. fasciuncula.* Occurs almost everywhere.—*M. literosa.* Bakewell, Willington, Derby, and Barrow.—*M. arcuosa.* Bakewell, Bretby, and Repton Shrubs.

Grammesia trigrammica, Hufn., =*trilinea*, Bork. Common south.

Stilbia anomala. One at Findern (W. Garneys).

Caradrina morpheus. Common throughout the county.—*C. alsines.* Bakewell and Barrow. — *C. taraxaci*, Hb., =*blanda*, Tr. Derby, Barrow.—*C. quadripunctata*, Fb., =*cubicularis*, Bork. Everywhere.

Rusina tenebrosa. Repton Shrubs.

Agrotis puta. Recorded by Mr. J. Hill.—*A. suffusa.* Fairly common in south-west.—*A. saucia.* Rare. Somershall, Willington.—*A. segetum.* Very common everywhere.—*A. exclamationis.* Common.—*A. corticea.* I have taken this moth commonly at sugar at Chellaston.—*A. nigricans.* Derby, Barrow, and Bretby.—*A. tritici.* Barrow (Rev. G. A. Smallwood).—*A. aquilina.* Rare. Bretby.—*A. obelisca.* Bred from larvæ taken at Derby (G. Baker).—*A. agathina.* Breadsall Moor (G. Baker). —*A. strigula*, Thnb., =*porphyrea*, Hb. Breadsall Moor (G. Baker). Frequent (Rev. R. H. Fuller).—*A. obscura*, Brahm., =*ravida*, Hb. Barrow (Rev. G. A. Smallwood).—*A. simulans*, Hufn., =*pyrophila*, Fb. Somershall, rare (E. Brown).

Noctua glareosa. Recorded by Mr. J. Hill and Rev. R. H. Fuller. —*N. augur.* Common.—Var. *helvetina.* Derby.—*N. plecta.* Common throughout. *N. c-nigrum.* Throughout the county.—*N. triangulum.* Bakewell and Bretby.—*N. brunnea.* Abundant.—*N. festiva.* Common south, occasionally north.—*N. dahlii.* Recorded as Derbyshire by Newman.—*N. subrosea.* One taken in 1857 (J. Hill). Once at Little

Eaton (G. Baker).—*N. rubi*, View., = *bella*, Bork. Common in the south of the county. — *N. umbrosa*. Common. — *N. baia*. Fairly common.—*N. xanthographa*. Exceedingly common everywhere.

Triphæna ianthina. Bretby, Barrow. — *T. fimbria*. Willington, Repton Shrubs, Bretby, and Little Eaton.—*T. interjecta*. Willington, Barrow. One specimen in Monsal Dale (Miss E. M. Alderson).—*T. orbona*, Hufn., = *subsequa*, Hb. Recorded from Derbyshire by Newman. — *T. comes*, Hb., = *orbona*, Fb. Common. — *T. pronuba*. Abundant everywhere.

Amphipyra pyramidea. Repton.—*A. tragopogonis*. Common.

Mania typica. Common as far north as Bakewell.—*M. maura*. Frequent south.

Panolis piniperda. Recorded by Mr. Hill.

Pachnobia rubricosa. Common.

Tæniocampa gothica. Abundant. — *T. incerta*, Hufn., = *instabilis*, Esp. Common.—*T. populeti*. Bretby, Barrow.—*T. stabilis*. Common throughout the county.—*T. gracilis*. Chellaston, Willington, Derby, and Little Eaton.—*T. munda*. Repton.—*T. pulverulenta*, Esp., = *cruda*, Tr. Common.

Orthosia suspecta. Recorded by Mr. J. Hill.—*O. upsilon*. Recorded by Mr. J. Hill and Rev. G. A. Smallwood.—*O. lota*. Chellaston, Drakelow, Repton, Bretby.—*O. macilenta*. Recorded by Mr. Hill.

Anchocelis rufina. Only taken by Mr. Hill.—*A. pistacina*. Common everywhere.—*A. lunosa*. Barrow.—*A. litura*. Common in the south.

Cerastis vaccinii. Common.—*C. spadicea*. Frequent south.

Scopelosoma satellitia. Everywhere.

Xanthia citrago. Repton and Bretby.—*X. fulvago*, L., = *cerago*, Fb. Common.—Var. *flavescens*. Occasionally throughout the south-west. —*X. flavago*, Fb., = *silago*, Hb. Abundant.—*X. gilvago*. Abundant in the south.—*X. circellaris*, Hufn., = *ferruginea*, Esp. Occurs commonly almost everywhere.

Cirrhœdia xerampelina. Repton, Willington, Barrow, Derby, Dovedale.

Tethea subtusa. Barrow and Bretby.

Cosmia paleacea, Esp., = *fulvago*, Hb. Recorded as a Derbyshire moth by Newman.

Calymnia trapezina. Common south.—*C. pyralina*. Derbyshire (Newman). — *C. diffinis*. Etwall. — *C. affinis*. Derby, Bretby, and Barrow.

Dianthœcia capsincola. Barrow.—*D. cucubali*. Bakewell, recorded three times (Rev. R. H. Fuller). I have taken one specimen at Chellaston.—*D. carpophaga*. Common at Bretby.

Polia chi. Common, Bakewell (Rev. R. H. Fuller). Barrow (Rev. G. A. Smallwood). Little Eaton, common (G. Baker). Near Ashbourn (H. T. Gibson). Bakewell, common (Rev. C. F. Thornewill).—*P. flavicincta*. Derby.

Dasypolia templi. Milford, at light, by Mr. G. Pike; and Derby, at light, by Mr. G. Baker.

Cleoceris viminalis. Recorded by Rev. G. A. Smallwood and Mr. Hill.

Miselia oxyacanthæ. Occurs everywhere.—Var. *capucina*. Occasionally in the south-west.

Agriopis aprilina. Common in the south, but Rev. R. H. Fuller has only four records at Bakewell, and Mr. Hooke three at Eckington.

Euplexia lucipara. Common in southern and central districts.

Phlogophora meticulosa. Abundant everywhere.

Aplecta prasina, Fb., = *herbida*, Hb. Occasionally south of Bakewell.—*A. occulta.* Once at Drakelow (G. Baker). Three at sugar at Bretby, 1881 (T. Gibbs). Also recorded by Rev. G. A. Smallwood and Mr. J. Hill.—*A. nebulosa.* Common south.

Hadena adusta. Frequent at Bakewell. Willington. — *H. protea.* Fairly common.—*H. glauca.* Wirksworth (Mr. Hill).—*H. dentina.* Common.—*H. trifolii*, Rott., = *chenopodii*, Fb. Stapenhill.—*H. dissimilis*, Kn., = *suasa*, Bork. Repton Shrubs, Derby, and Barrow.—*H. oleracea.* Common in the south of the county.—*H. pisi.* Bretby, Repton, Little Eaton.—*H. thalassina.* Common south, rarer north.

Xylocampa areola, Esp., = *lithoriza*, Bork. On sallow blossoms (W. Garneys).

Calocampa vetusta. Bretby.—*C. exoleta.* Willington, Bretby, and Barrow.—*C. solidaginis.* Recorded once (Rev. R. H. Fuller). Also recorded by Mr. Hill.

Asteroscopus sphinx, Hufn., = *cassinea*, Hb. On lamps on Burton Bridge (E. Brown). Larvæ at Bretby (Rev. C. F. Thornewill).

Cucullia verbasci. Ticknall, Derby, and Newton Solney.—*C. chamomillæ.* Larvæ at Willington (W. Garneys).—*C. umbratica.* Common.

Gonoptera libatrix. Abundant south, occasionally north.

Habrostola tripartita, Hufn., = *urticæ*, Hb. Common.—*H. triplasia.* Common south, frequent at Bakewell.

Plusia chrysitis. Common everywhere.—*P. festucæ.* Derby and Barrow.—*P. iota.* Common.—*P. pulchrina.* Common everywhere in the county.—*P. gamma.* Common throughout.—*P. interrogationis.* Records exist of its occurrence in Derbyshire (Newman).

Anarta myrtilli. Breadsall.

Heliaca tenebrata, Scop., = *arbuti*, Fb. Barrow and Breadsall.

Heliothis dipsaceus. Once at Breadsall (G. Baker).

Chariclea umbra, Hufn., = *marginata*, Fb. Breadsall.

Phytometra viridaria, Clerck., = *ænea*, Hb. Derby and Bakewell.

Euclidia mi. Dovedale.

Brephos parthenias. Repton Shrubs. Reported (Rev. R. H. Fuller).

(To be continued.)

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By Arthur G. Butler, Ph.D., F.L.S., &c.

(Continued from vol. xxvii. p. 267.)

Poaphila vinculum.

♂ *Phurys vinculum*, Guenée, Noct. 3, p. 504, n. 1758 (1852).
♂ *P. lima*, Guenée, *l. c.*, n. 1759 (1852).
♂ *Poaphila obversa*, Walker, Lep. Het. xiv. p. 1473, n. 14 (1857).
♂ *P. dissocians*, Walker, *l. c.*, p. 1477, n. 23 (1857).

United States, Georgia, Texas. In Coll. B. M.

Walker identified certain examples of this species with Guenée's *Poaphila herbarum*, and the specimens which he recognized as *P. vinculum* are probably faded examples of *P. sylvarum*. The two supposed species *P. vinculum* and *P. lima* differ less than the sexes; *P. lima* is a male form, in which the outer transverse stripe is more than usually sinuous, and both stripes have more than usually dark diffused external borders.

Poaphila iniqua.

♀ *Nymbis iniqua*, Guenée, Noct. 3, p. 321, n. 1784 (1852).
♂ *Celiptera? infecta*, Walker, Lep. Het. xiv. p. 1847, n. 2 (1857).
♀ *Mocis? refracta*, Walker, *l.c.*, p. 1488, n. 2 (1857).
St. Domingo. In Coll. B. M.

Poaphila bistrigata.

♂ *Geometra bistrigata*, Hübner, Exot. Schmett. Zutr., figs. 111, 112.
Poaphila herbarum, Guenée, Noct. 3, p. 303, n. 1757 (1852).
United States. Female in Coll. B. M.

Guenée says of his *P. herbarum* that it is very close to *bistrigata*, but it is larger, less brightly coloured, and has the second line regularly arched instead of slightly sinuous. It is characteristic of the species that the yellow border to the second line is outside instead of inside it. Guenée's distinctions are trivial and valueless. Walker identified specimens of *Phurys immunis* as *Poaphila bistrigata.*

FODINA, *Guen.*, and COLBUSA, *Walk.*

These two genera are so similar in colouring, pattern, and form, that they have been confounded in collections. *Fodina* has long upcurved palpi, and will include the following species:—*F. oriolus*, *pallula*, and *stola*, *Athyrma albicincta*, Walk., *F. sarmentosa*, *ostorius*, and *euclidicola*, with their allies, and *Trigonodes cuneigera*, Butl.

Colbusa will take *C. euclidica*, *Grammodes conjungens*, *G. mygdon*, *G. delta*, and their allies. In this genus the third joint of the palpi is very short.

I think it very doubtful whether *Sarrothroceras*, Mabille, can be structurally distinguished from *Fodina;* but, at present, we only have the female of his typical species.

The genus *Calyptis* should, in my judgment, stand next to *Colbusa* (it is certainly not a Plusiid), and should be followed by *Cabralia*, Moore.

Phurys biangulata and *Trigonodes obstans* may be placed under *Heteropygas*, Guen., to which genus I think *Pelamia* must be allied; but I only know the latter from Guenée's figure.

TRIGONODES, *Guen.*

The number of species made out by Guenée is extraordinary, seeing how little the much divided *T. hyppasia* varies:—

Trigonodes hyppasia.

Phalæna hyppasia, Cramer, Pap. Exot. 3, p. CCL, E. (1782).
Ophiusa anfractuosa, Boisduval, Faune Ent. de Madag. p. 104, n. 8, pl. 15, fig. 6 (1833).
Trigonodes acutata, Guenée, Noct. 3, p. 283, n. 1728 (1852).
T. inacutata, Guenée, *l. c.*, p. 284, n. 1729 (1852).
T. exportata, Guenée, *l. c.*, n. 1730 (1852).
T. compar, Walker, Lep. Het. xiv. p. 1451, n. 9 (1857).
Chalciope mahura, Felder, Reise der Nov. Lep. iv. pl. cxvii. fig. 13.
C. deltifera, Felder, *l. c.*, fig. 24.
Asia, Africa, and Australia. In Col. B. M.

It is absolutely impossible to distinguish any of the above supposed species when one possesses a good series of specimens.

Trigonodes cephise.

♂ *Phalæna cephise*, Cramer, Pap. Exot. 3, p. 59, pl. ccxxvii., fig. c (1782).
♀ *Trigonodes maxima*, Guenée, Noct. 3, p. 282, n. 1723 (1852).
♂ N. India, ♀ E. India, ♂, ♀ Moulmein and Fiji. In Coll. B. M.

Though apparently very dissimilar, if the sexes of this species are carefully compared on both surfaces, it will be seen that the actual differences are unimportant, and only such as one often finds in the Lepidoptera as distinctive markings between the sexes. It must, however, be insisted on that males and females from the same locality be compared; since, in widely distant localities, I find the colouring of the under surface somewhat modified, our Fijian specimens being redder below than those of India.

Trigonodes lucasii is unknown to me, but hardly seems (from the description) to belong to this genus.

My *Euclidia consors* must sink as a synonym of Lederer's *E. dentata*, from which it only differs in the slightly wider blackish submarginal band on the secondaries. When I described the Japanese insect, *E. dentata* was not in our collection, but Zeller's series includes a specimen from Siberia.

I agree with Felder in the opinion that *Drasteria* is nearly allied to *Euclidia* (Grote places both genera in the Catocalinæ, but I cannot follow him, for they seem to me much better placed near *Remigia*, placed by him in his Toxocampinæ). As already noted, *Toxocampa* does not belong to the Quadrifidæ, and therefore can have nothing in common with *Remigia* and allies.

DRASTERIA, *Hübn.*

This genus is very nearly allied to *Remigia;* it, however, has less slender and compressed palpi. The typical species, *D. erechtea,* is widely distributed and very variable, so that it could hardly escape being described several times over.

Drasteria erechtea.

♂ *Phalæna erechtea,* Cramer, Pap. Exot. 3, p. 149, pl. cclxxv., E (1782).

♀ *Drasteria erichto,* Guenée, Noct. 3, p. 290, n. 1736 (1852).

Microphysa sobria, Walker, Lep. Het. xii. p. 835, n. 6 (1857).

Poaphila patibilis, Walker, *l. c.,* xiv. p. 1471, n. 11 (1857).

P. narrata, Walker, *l. c.,* p. 1474, n. 17 (1857).

♂ *Remigia impressa,* Butler & Druce, Cist. Ent. v. p. 117 (1872); Butler, Lep. Exot. pl. lxi. fig. 19 (1874).

Canada, United States generally, and Costa Rica. In Coll. B. M.

Most of the specimens recorded by Walker had no labels of any kind upon them; in fact, the following were the only specimens bearing localities of those placed under *D. erechtea:*—Two from Trenton Falls, two from Nova Scotia, and two labelled "N. Y." All the others Walker must have guessed at, since they had never been ticketed with either register-number or locality, and consequently were so much useless lumber. As it is, we now have an immense series of specimens with localities.

REMIGIA, *Guen.*

In spite of the fact that this genus and *Drasteria* were placed in different families by M. Guenée, they are so closely allied that I consider their distinctness doubtful.

Remigia archesia.

♀ *Phalæna archesia,* Cramer, Pap. Exot. 3, pl. cclxxiii. figs. F, G (1782).

♂ *P. virbia,* Cramer, *l. c.,* fig. H (1782).

♀ *Remigia mayeri,* Boisduval, Faune, Ent. de Madag. p. 104 (1833).

♂ *R. pellita,* Guenée, Noct. 3, p. 19, n. 1780 (1852).

♀ *R. gregalis,* Guenée, *l. c.,* p. 320, n. 1782 (1852).

R. mutuata, Walker, Lep. Het. xiv. p. 1505, n. 15 (1857).

R. jugalis, Walker, *l. c.,* n. 16 (1857).

♂ *Hypætra diffundens,* Walker, *l. c.,* Suppl. 3, p. 963 (1865).

♀ *Remigia associata,* Walker, *l. c.,* p. 1010 (1865).

R. inconcisa, Walker, *l. c.,* p. 1013 (1865).

♂ *R. bifasciata,* Walker, *l. c.,* p. 1014 (1865).

Asia and Africa. In Coll. B. M.

R. demonstrans, Walk., from the Navigators' Islands, and *R. discrepans,* Butl., from Fiji, are local forms, both differing from *R. archesia* in having the inner line of the central area of primaries perpendicular instead of oblique (if anything, the direction is from inner margin obliquely outwards to costa); the two latter differ chiefly in colouring, and may prove to be one species. Walker recorded four examples from the Navigators' Islands, one of which was a mere wreck, unfit for any collection; and a second specimen equally bad, and labelled "Cent. Ind.," which was, of course, *R. archesia*.

The species into which the abundant and widely distributed *R. repanda* have been split up, simply represent an instance of what has been aptly called "sorting marbles"; all specimens in which a line has faded out have been placed under one name, and all the varying shades have been carefully matched under other names. The fact that the most distinct of the various named sports constantly come together in the same collections, appears not to have raised a question as to their distinctness as species in the minds of their describers, or their successors; indeed, Guenée indignantly says:—"On a confondu la *Latipes* avec la *Repanda* de Fabricius, qui m'en parait distincte; c'est de la première que parle M. Boisduval dans son *Genera*, p. 170, quand il cite les pays différents qu'il lui assigne pour patrie, ainsi que M. Duponchel, qui, dans son Catalogue, ne fait guère que répéter, de confiance, l'assertion de M. Boisduval. Ni l'un ni l'autre ne parait avoir distingué la véritable *Repanda*, qui semble habiter exclusivement les Antilles."

On looking at M. Guenée's description of *R. repanda*, it is amusing to note the following observation:—"Je n'ai vu que des femelles. Je ne connais pas le mâle, qui doit avoir beaucoup de rapports avec celui de la *Megas*." How far this belief was confirmed will be seen by referring to Walker's catalogue under *R. latipes*, where a male from S. Africa, indistinguishable from St. Domingo males in our collection, is recorded. The type of Walker's *R. conveniens*, from the Congo, belongs furthermore to the form recognized as *R. repanda* by M. Guenée. Hübner's figure, quoted by M. Guenée, is either incorrect, or it represents a distinct species, the undulation of the subbasal line (extra-basilaire) being unlike that of any *Remigia* known to me. It is tolerably certain to be incorrect.

Remigia repanda.

Noctua repanda, Fabricius, Ent. Syst. 3, 2, p. 49, n. 133 (1793).
Remigia latipes, Guenée, Noct. 3, p. 314, n. 1774 (1852).
Ophiusa delinquens, Walker, Lep. Het. xiv. p. 1423, n. 11 (1857).
Remigia disseverans, Walker, *l. c.*, p. 1495, n. 3 (1857).
R. persubtilis, Walker, *l. c.*, p. 1497, n. 7 (1857).
R. mensuralis, Walker, *l. c.*, p. 1499, n. 9 (1857).

R. exscindens, Walker, *l. c.*, p. 1500, n. 10 (1857).
R. subtilis, Walker, *l. c.*, p. 1501, n. 11 (1857).
R. conveniens, Walker, *l. c.*, p. 1507, n. 19 (1857).
R. detersa, Walker, *l. c.*, Suppl. 3, p. 1012 (1865).
R. munda, Walker, *l. c.*, p. 1020 (1865).
Baratha acuta, Walker, *l. c.*, p. 1022 (1865).
Remigia indentata, Harvey (see Grote's Check-List, p. 41, n. 1276).

Madagascar, Africa, Arabia, N. and S. America. In Coll. B. M.

The sports of this species represent about four ill-defined types, with their intergrades.

(1.) *R. repanda*, typical (we have it from Jamaica); represented also in the Museum series by *R. latipes!* from Madagascar, the Congo, Aden, Sao Paulo, and St. Domingo (*R. persubtilis*).

(2.) *R. subtilis*, Walker, = *indentata*, Harvey, a dark variety, from Rodriguez, S. Africa, the Congo, Abyssinia, Aden, Rio Janeiro, Goya, Surinam, Pará, Santarem, St. Domingo, Venezuela, Jamaica, Chontales, and the United States.

(3.) A variety intermediate between 1 and 2 = *R. conveniens*, Walk., from the Congo, Sierra Leone (*R. detersa*), Aden, Rio Janeiro, Sao Paulo, Surinam, St. Domingo (*R. exscindens*), Honduras (*Baratha acuta*), and East Florida (*R. disseverans*).

(4.) Lastly, a reddish variety, rather more distinct than the other three, though linked by intermediate grades to (2), from Honduras = *R. mensuralis;* we have this also from the Congo, Aden, Espiritu Santo, St. Domingo, and Trinidad.

All the four types, therefore, with their intergrades, occur constantly together, and there can be very little doubt that they represent one widely-distributed, abundant, and variable species. It is, of course, very probable that the above synonymy will have to be added to when other named forms (at present unknown to me) come to hand.

(To be continued.)

ABERRATIONS IN THE STRUCTURE OF APPENDAGES IN THE COLEOPTERA.

By T. H. Garbowski, Ph.D., J. U. C.

Although the Arthropoda generally provide an immense amount of material to the student of Teratology, nothing is more interesting than the occasional instances of abnormal limb-development. In the following note I have described two interesting cases, the first of which—a male of *Lucanus cervus* var. *capreolus*—shows a hypertrophical multiplication of the antennæ; the second is an instance of atrophy in the right hind foot of *Hygrocarabus variolosus*.

The *Lucanus* has the left antenna (Fig. I.) trebly branched instead of single as in the type. There is a single normal scape (*sc*) as in the right antenna (Fig. II.), but it is considerably shorter, shows less curvature on the outer border, and the proximal portion is slightly thicker; while it is less hairy on the club-shaped farther part, which at the extremity is bare. The hypertrophy commences at the next joint—the pedicellus—*2* in our figure, from which springs a branch turning outwards (*a*), the pedicellus being continued as the main axis (*b*). The joint next to the pedicellus (*3*) carries the third branch (*c*), which turns inwards in the direction of the insect's head.

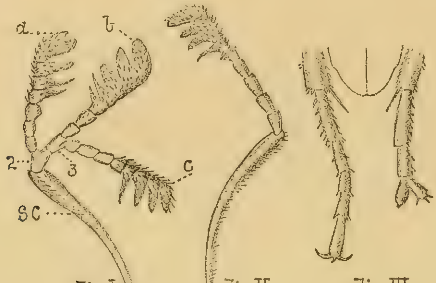


Fig. I Fig. II Fig. III

From the pedicellus to the end, the normal antenna consists of eight joints, the first three of which are cylindrical; the remainder, being flattened, form the fan. In this aberration the rounded shape of the pedicellus and the next joint is altered to T-form by the growing out of the branches, and a deep trough-like depression marks the borders of both offsets, so that a transverse section would be biscuit-shaped instead of round. These two joints are also much stronger and thicker than in the normal antenna.

The three joints intermediate between the fans and the pedicellus do not show any noteworthy departure from the type on either of the branches, and the fans, except in one instance, do not exhibit more than ordinary divergences from the normal form. The outermost branch of the left antenna has the tubercle on the fifth joint very strong. The first two joints of the fan are like those of the other branches and the right antenna, but the third lamella is much more fully developed, and carries some sharp barbs or spines. The two final joints also are very strong, but what is in the highest degree remarkable, they form a solid block, as it were, instead of being divided into two separate segments.

The lamellæ of this thrice-branched left antenna appear to have been originally turned downward, whereas the leaves of the normal fan are directed toward the shoulder part.

The specimen was found by Prof. Grobben in the entomological collection of the II. Zoological Institute of the University of Vienna. The locality is unknown.

The second case is in the right foot of the third pair of legs of *Hygrocarabus variolosus* (Fig. III.). The normal left tarsus is composed of five joints, of which the proximal final joint with the claws is longest; the second is shorter by nearly one-half than the first; the third and fourth still shorter. All the joints are cylindrical, slender, and narrower at the base, with spines at the distal end. The basal, and partially also the next joint, have longitudinal rows of soft pointed spines. While the femur and tibia of the right foot correspond in the length and arrangement,—with the exception of the stronger distal incrassation and the longer inner ray of the tibia,—with the same parts of the normal foot, the tarsus, on the contrary, is reduced by three joints. The two first joints are longer and stronger than usual, but they are less hairy than those of the left foot. The last joint is quite flattened, heart-shaped, somewhat hollowed beneath, and divided into two flaps, which reminds one of an uncus. The claws spring from the terminal border of one of the flaps.

This example came from the Plateau of Podolia.

The recorded cases of supernumerary antennæ in insects are enumerated and considered in Bateson's 'Materials for the Study of Variation'; Dr. Garbowski's individual appears to come in Bateson's category of "extra antennæ arising together." The whole of the cases enumerated by Bateson under this category are Lamellicornia. Dr. Garbowski's case is that of a Pectinicorn, and is extremely interesting from the strong evidence it offers—as we shall hereafter explain—of the exact nature of the aberration, or variation, as Bateson prefers to call these departures from the usual. It has been customary to look on similar cases as "freaks of nature," and it has been one of the great merits of Bateson's work that he has shown that these curious freaks are evidently subject to law, for they display remarkable symmetry, and are found to be in many respects normal in their abnormalities. Dr. Garbowski's case shows in a very interesting manner the preservation of the usual number of joints in the unnatural parts, and also their presentation of a new symmetry, the organs introduced as supernumerary on the left side of the body being not repetitions of left-sided organs, but a pair—right-hand and left-hand.

Asking the reader to refer to Fig. I., where the unusual structures described are figured, it will be gathered that they are placed on the left side of the body. Fig. II. represents the natural antenna of the right side of the body, to which the triple structure (Fig. I.) corresponds, or rather replaces, on the left side of the individual. There are three incomplete antennæ (*a*, *b*, *c*), each of which, however, is rendered complete by parts (*sc*, *2*, *3*), which are common property, as it were, of itself and of one or both of the other incomplete antennæ. If the joints, commencing at each of the three outer extremities and going to the base of the whole, be counted, it will be found that *a* and *b* have each ten joints, while *c* has eleven. There being three antennæ on one side of the body, two of them are, of course, in excess of what is natural. If we look at the three we note that *c*, if placed erect, is a left-hand antenna, and thus, taken in conjunction with the antenna of the other side of the body, forms a natural pair. The reverse of this is the case with *b*, which it will be noticed is a right-hand antenna, though placed on the left side of the body; this antenna is therefore clearly unnatural: *a* is again, like *c*, a left-hand antenna, and if *b* and *c* were taken away it would form, with the antenna on the other side of the body, a natural pair. It would thus appear that either the pair *a b* or the pair *b c* is supernumerary. There are, however, certain facts that create a strong presumption that the pair *a b* are really parts added to a normal antenna, *c*. We have seen that *b* is certainly an interpolation; now, as *a* pairs with it, we may conclude that *a* is the fellow of *b*, and *b* being an interpolation, it is probable that *a* is also such. This presumption is supported by the numbers of joints in the three organs. The natural number of joints in a normal antenna of *Lucanus cervus* is ten. As we have already mentioned, *a* and *b* agree together in having ten joints, of which *sc* and *2* are common to both; *c*, however, has, if we count the joint *2* as belonging to it, eleven joints, or one more than is natural in *Lucanus*. But the joint *2* is the common property of *a* and *b*, and if we do not count it as forming any part of *c*, then the latter has the natural number of joints, ten. Thus, if we take it that the pair *a b*, including their common joint *2*, is an interpolation between two joints of the normal antenna, *sc*, *c*, there is clearly much in favour of our assumption. There is a further piece of evidence that *c* represents the normal left antenna, for if its club be looked at it will be seen that, like the club of the natural antenna on the other side of the body, it consists of four joints; so that the two pair with one another in this respect: *a* and *b* have each five joints in the club, so that they pair with one another in this respect, but do not agree with either *c* or the natural antenna.

Several other points of interest are suggested by this remarkably perfect monstrosity, but in the absence of a minute examination of the specimen—which we understand is the property of an institution in Vienna—it is impossible to form an opinion about them. We may, however, remark, in connection with the number of joints in the club, that this character is subject to variation in *Lucanus cervus*, though it is the rule that some of the departures from the normal are only found in certain localities. It is therefore interesting to observe that the intercalated pair of antennæ is not, as regards the club, conformable with the natural antenna of this individual, being, in fact, five-jointed instead of four-jointed. We have, in fact, the antennæ of one variety added to those of an individual that itself is of a different variety; just, as we have already seen, we have in the case of *b* a right-hand structure formed on the left-hand side of the body.

It is seen from our figure that the joint *2*, which is the common property of two antennæ, is evidently a double joint. Now, as the scape, *sc*, is the common property of three antennæ, it would be interesting to examine whether it bears any trace of a triple structure; it is evidently thicker than natural, but this may only be due to its having a thicker joint *2* than is natural. The structure of the joint *3* is amongst the most peculiar of the questions that are suggested: according to the view we take it is part of *b* and *c*, right-hand and left-hand structures. Is it a double joint, and is one side of it left-hand, the other right-hand?—D. SHARP.

NOTES AND OBSERVATIONS.

NOTE ON APORIA CRATÆGI.—Referring to the occurrence of this species in open places rather than woods, Mr. W. Warde Fowler, in 'Nature' (No. 1320), says that in the years 1857–1859 he used to find it "tolerably abundant" on a common about a mile and a half to the west of Cardiff. This common was quite an open one, without any adjacent woodland and very little hedge timber. In No. 1321 of the same periodical Mr. Goss states that he met with the species "in abundance in the New Forest in 1866, 1868, 1869, and 1870." He adds, "It rarely occurred in or near dense woods, but preferred the open heaths and wastes of the Forest, where thistles were plentiful. In 1867 I found the species swarming, about midsummer, in hay-fields on hill-sides in Monmouthshire. There were a few small orchards, but not much wood in the neighbourhood."

RE A HUNT FOR PHORODESMA SMARAGDARIA.—Having just received the March number of the 'Entomologists' Monthly Magazine,' and read Mr. Auld's description of a hunt for *P. smaragdaria*, I am simply amazed to think that in these matter-of-fact times we should have a veritable Rip van Winkle arise in our midst to tell us this old story, which we all knew so well, *as something new*. Or is it that we live in such very fast times, that the discovery of this particular larva about eight years ago, when its whole history was made known, has already become ancient history, and the true facts lost in the dim past? that we are treated to this mythical, and not very elevating anecdote, of the "beetle-catcher and his friend," which, I need hardly say, existed only in the imagination of the narrator. The memory of my late friend (Mr. Machin) alone induces me to notice Mr. Auld's absurd statement, and to inform him that the correct account is to be found in the

'Entomologist,' vol. xvii. p. 235; also in the 'Transactions' of the Entomological Society of London, October, 1886; and if he reads them carefully, I think he will come to the conclusion that his disparaging "story" (as he calls it) of one of our best practical field entomologists, only so recently passed from us, is at the present time particularly ill-chosen, and shows, to say the least of it, very bad taste.—Geo. Elisha; 122, Shepherdess Walk, City Road, March 1st, 1895.

Izal and Relaxing Boxes.—During last season I made the discovery that a small quantity of "Izal"—which is a disinfectant produced from the fumes of coke ovens—poured into a zinc relaxing-box, and allowed to stand for a few hours, admixed with water, entirely prevents the growth of mould. I found I could keep insects in a relaxing-box occasionally treated in this way, in a suitable condition for setting, from five to seven days; further, that a number of insects which I had left in a relaxing-box so treated, and forgotten for over six weeks, had not a trace of mould about them at the end of that time, but when handled, presented a similar appearance to that produced by squeezing between the fingers a bit of rotten vegetable matter. I confirmed this by subsequent experiments. Perhaps some of your readers, who occasionally find themselves compelled to keep insects relaxed for a few days, might feel inclined to try this, and I should be glad to know if their experience tallies with mine.—W. Tunstall; Meltham, near Huddersfield.

The late Mr. Machin's Sale.—The answer to Juliet's query may possibly be found in the result of the sale of the late Mr. Machin's collection at Stevens's on the 26th of last month. It would savour of impertinence on the part of the writer to say that Mr. Machin was a well-known lepidopterist; few of us, indeed, interested in this group but have had more or less direct personal communication with him. It was therefore with feelings of considerable interest that I went to look over the collection before its dispersal. The first thought that occurred to me was that it had been very much over-catalogued; and although a subsequent and more careful inspection tended somewhat to modify first impressions, there is little doubt that whoever undertook this portion of the work did take a somewhat roseate view of his duties. Notwithstanding this, and the more than perceptible trace of mould exhibited, it must be conceded that the prices obtained were exceedingly stiff, and in many instances reached high-water mark. As far as I am aware, £4 10s. for a single specimen of *Noctua subrosea* (which doubtless now graces the Tring museum) is a record, any way, for auction prices of this species. Altogether the Macro-Lepidoptera realised between £350 and £360, a result very comforting to the deceased's representatives, especially if it is the fact, as I have been informed, that the whole collection was offered to the Brighton museum for £220. To go into particulars:—Lot 7, which fetched 32/6, as per catalogue, included a pale form of *Euchloë cardamines*, and also a curious variety. The first was a faded male, very old, the colour due only to fading, as the base of the wings exhibited a smoky brown instead of the usual clear grey of fresh specimens; the "curious variety" was a very poor specimen, and apparently the orange had been removed from the right side, as a few orange scales remained. Both this wing and the secondaries were much stained. Lots 10 and 11, which realised £1 12s. 6d. and £2 2s., each contained a really nice variety of *Argynnis paphia*. The first was a fine and perfect female with unusually conspicuous blotches on the under surface of the primaries, having on the central portion of each wing a large black blotch. The other variety was also a fine female with marginal and submarginal spots forming a series of black bars. Lot 15, £3 10s., was described as a magnificent variety of *Vanessa cardui*. It was only a fair variety, and required some examination before one detected that the largest costal white blotch was almost absent; otherwise it was a normal specimen. Lot 16 was a var. of *Apatura iris*. The specimen was a small male with yellowish under wings, due principally, in my opinion, to dwarfism caused by bad rearing, and was very dear at £3 5s. There were five specimens of *Polyommatus dispar*, which fetched £2, £4 8s., £3, £3 10s., and £5 5s.; also an under side, a doubtful specimen, looking much like the var. *rutilus*; this fetched £3 5s. Lot 29 contained a fine variety of *P. phlœas*, perhaps the finest example of the blue spots forming a conspicuous blue bar I have seen; it realised £3 10s. Five *Lycœna acis* fetched about £1 each, and a series of nine *L. arion* from Barnwell Wold £2 10s. One *Deilephila euphorbiœ* from Mr. Thomas Boyd, 28/–, and eight *D. galii*, from Mr. Tester and Mr. Sidebotham, £3 17s. 6d. the lot. A specimen of *Sphinx pinastri*, bought by Mr. Bond out of Waile's cabinet, fetched 30/–. Lot 46, containing twenty-nine ordinary clearwings, fetched £3. Two lots of three and two *Sesia scoliiformis* fetched £1 15s. and £2 2s.; *S. sphegiformis*, for two and four specimens from the usual locality, bringing 20/– and £2 5s. An orange *Zygœna trifolii*, with other nice forms, cost £3 10s.; whilst a parti-coloured *Z. filipendulœ*, with five *Nola albulalis*, fetched £2 10s. Five *N. albulalis*, with the same number of *N. centonalis*, fetched 27/6; the next lot, consisting of six of the latter, bringing 30/–. The vars. of *Arctia caia* were very ordinary, and the prices realised for lots of four, four, three, and two, *viz.*, 12/–, 40/–, 42/–, and 21/–, looked very much as if some one had an open commission to execute. Lot 76, nine specimens of *Ocneria dispar*, was described as a fine series of the old fen form—one black var. Here we have the usual error; the black var. itself is the old fen form, the other brown specimens being the common form. There were ten *Lœlia cœnosa* from Wicken Fen, sold in pairs, the prices being 35/–, 37/6, 27/6, 40/–, and 42/–. Eight *Lasiocampa ilicifolia*, from Mr. Bonny, also sold in pairs, and being in perfect condition, cost £2 5s., £4 5s., £3 3s., and £3; whilst pairs of *Drepana sicula* brought 18/–, 22/–, 24/–, 32/6, and 22/–. Ditto of *Dicranura bicuspis*, from Tilgate, 26/–, 30/–, and 27/6. Eight *Notodonta dictœa* and eleven *N. dodonea* brought £2, whilst nine *N. dictœoides* and ten *N. chaonia* 30/–. *Cymatophora fluctuosa* and *C. ocularis*, four each, 30/–; four *C. fluctuosa*, with others, 32/6; four *C. ocularis*, with others, only 12/–. A pair of *Leucania albipuncta*, with a history, £2; a single specimen, with four *Nonagria brevilinea*, including two vars. *alinea*, only 18/–. A nice series of *Senta ulvœ*, and others, £2 10s.; and pairs of *N. sparganii* and *Xylomiges conspicillaris*, the latter from the Rev. Horton, 30/– and 21/– respectively. Three *Crymodes exulis* an average of 26/– each. The *N. subrosea* obtained record prices: the first two pairs fetched £4 and £5 5s.;

Lot 157, a single female, £4 10s.; whilst the last pair, from Lord Walsingham, and which the writer considered the pick of the lot, he obtained for £4 5s. A nice series of six *Polia nigrocincta* fetched £2 5s.; whilst eight good *Dianthœcia albimacula*, and a beautiful form of *Polia chi* var. *olivacea*, with others, brought only 5/–. Eight good *Xylina conformis* went Doverwards for £3 7s., whilst the nine *Cucullia gnaphalii* were purchased by one gentleman for £8 10s. A *Catocala fraxini*, from Mr. Edmunds's collection, realised 20/–. Some nice *Amphidasys betularia*, including a rather worn buff var., 30/–. Pairs of *Cleora viduaria* 35/–, 65/–, and 55/–. In the emeralds Mr. Machin was unusually strong. A beautiful banded var. *Pseudoterpna cytisaria*, with five *Phorodesma smaragdaria*, bred by Mr. Machin from Fobbing, Essex, fetched £2; another five of the latter insect, with *Nemoria viridata*, went for 26/–. The *Acidalia* "*circellata*" were, in my opinion, poor, and very much like (what, by the way, they actually are) *A. straminata*, and fetched something like 10/– each. The *Phibalapteryx polygrammata* fetched 11/– each, a result which must make some of our older collectors,—with whom, I understand, this species used to be more or less of a pest, owing to its numbers,—regret they did not accept their opportunity.—T. W. Hall.

Caradrina superstes, Tr., as a British Species.—As Mr. South's list of recent additions to our British Lepidoptera (Entom. xxvii. 342) has brought the question of the occurrence of the above-named species in this country before the readers of the 'Entomologist,' and as my friend Mr. Hodges has mentioned my name in connection with the subject (Entom. xxviii. 17), I think it will be well to state that I have been thoroughly sifting the question, and that I have to retract my hasty expression of opinion, upon which Mr. Hodges based his note. Mr. Tutt had erroneously referred the Guernsey and Isle of Wight species (i. e., *ambigua*) to *superstes*, and it was on discovering this that I made the statement in question; but on investigation it appears that Mr. Tutt does possess the true *superstes* from Deal, and, therefore, that Mr. South's addition of the species to our fauna may stand. In a paper which I read last night before the City of London Entomological Society, I pointed out that Dr. A. Speyer has shown (Stett. Ent. Zeitung, xxviii. 73, &c.) that the male antennæ of *superstes* differ so entirely from those of *ambigua*, that no confusion between the two is possible. It also seems that *superstes* is quite specifically distinct from *taraxaci*, Hb., with which Guenée doubtfully unites it as a variety.—Louis B. Prout; 12, Greenwood Road, Dalston, N.E.

Collecting in Switzerland.—I intend to go to Switzerland in June, for about a fortnight's collecting of Lepidoptera, and should be very glad of any information as to the best place to make my head quarters, or two places for one week at each.—J. Hamilton Leigh; Brinnington Mount, Stockport.

CAPTURES AND FIELD REPORTS.

Xanthia ocellaris, Bork., near London.—On October 3rd, 1894, I captured at West Dulwich, on a gas-lamp near the College, a *Xanthia* which

I believe is to be referred to this species. Unfortunately, the specimen is rather worn, but seems to agree with the continental examples of *ocellaris* at the Natural History Museum. I do not think that *gilvago*—the species from which *ocellaris* seems to be separated only with difficulty—occurs here; but perhaps some reader of the 'Entomologist' can supply information on this point.—T. B. Fletcher; 78, Thornlaw Road, West Norwood, S.E., Feb. 3rd, 1895.

[Three specimens of *Xanthia ocellaris* were recorded as taken in Britain in 1893—one by Mr. Taylor at sugar on Wimbledon Common, September 27th; and one each by Prof. Meldola and Mr. Boscher, in the autumn, also at sugar, in the garden of Belle Vue House, Twickenham. All these specimens were of the form known as var. *lineago* (*vide* E. M. M. xxx. 161). *X. gilvago* ranges in colour from deep orange, with well-defined dark markings (sometimes suffused with dark greyish), to pale yellow with faint markings; and examples of the latter form are sometimes mistaken for *X. ocellaris*, but this last species is distinguished by its more pointed fore wings and a white dot below the reniform stigma.—Ed.]

Charæas graminis in Staffordshire.—My experience of *C. graminis* differs in some respects from that of Major Still (*ante*, p. 11). I used to take the insect frequently on Cannock Chase, when living at Burton-on-Trent. I found them at all hours of the day, but particularly during the afternoon, sitting on the flowers of the ragwort, from which I was able to box them without using the net. But these were almost invariably males, and were taken about a fortnight earlier than the date Major Still mentions, *viz.*, about the beginning of August, or even late in July. I never saw anything like the abundance described by Newman, or by your correspondent. The males have been taken freely at light by my friend Mr. R. Freer, of Rugeley, in the porch of his house, which is about a mile and a half distant from the nearest part of the Chase.—(Rev.) Chas. F. Thornewill; Calverhall Vicarage, Whitchurch, Salop, January, 1895.

Notes from Paignton, S. Devon.—I recorded (*ante*, p. 59) the capture of several *Heliophobus hispida*. This should have been *H.* (*Neuronia*) *popularis* in all cases.—C. M. Mayor; Jan. 30th, 1895.

The Illuminated Moth-trap.—A year having elapsed since I sent you an account of the working of my moth-trap (Entom. xxvii. 55), I send you a list of species captured during 1894, which had not previously been taken; and also of a few additional specimens of species which are rare, or of which I had only been able to chronicle the capture of one or two examples. Most of the species previously mentioned occurred again, but it is curious to note how certain species, which seem to occur more or less plentifully one year, are entirely absent, or comparatively scarce, another, and vice versâ; for instance, during 1894 the following, which occurred in 1893, were entirely absent, viz.:—*Notodonta trepida*, *Demas coryli*, *Agrotis segetum*, *A. corticea*, *A. tritici*, *Noctua plecta*, *N. umbrosa*, *Xanthia aurago*, *Aplecta nebulosa*, *Epione apiciaria*, *Cleora glabraria*, *Cidaria miata*, *C. fulvata*, *Botys asinalis*, *Leptogramma literana*, *Retinia pinicolana*, *Xanthosetia hamana*, *Epigraphia steinkellneriana*. With the exception of *Agrotis segetum*, *Xanthosetia hamana* (which I took in plenty on Riddlesdown near Purley), and *Cleora glabraria* (of which I took a female in the New Forest), I did not see any of the above at all during 1894. To set against this I took the following species new to my list:—*Vanessa* *cardui* (on Aug. 1st; this makes the second *Vanessa* taken at light, my last list containing *V. atalanta*), *Smerinthus populi* (1), *Nola cucullatella*, *Gnophria rubricollis* (1), *Drepana lacetinaria* (1 male), *Pterostoma palpina* (1 male), *Notodonta chaonia* (1 male), *Asphalia flavicornis* (1 male), *Apamea didyma*, *Caradrina alsines* (4), *Agrotis agathina* (2), *Amphipyra tragopogonis*, *Panolis piniperda* (2), *Orthosia lota*, *Hypenodes albistrigalis* (numerous), *Eurymene dolobraria* (1 male), *Nyssia hispidaria* (9 males), *Boarmia abietaria* (5 males), *Zonosoma porata* (4), *Z. linearia* (several), *Acidalia dimidiata* (several males and females), *A. emarginata* (1), *Aspilates ochrearia* (male and female), *Cheimatobia boreata* (several males), *Eupithecia pulchellata* (1), *E. absinthiata* (1), *E. rectangulata*, *Cidaria associata* (1), *C. testata* (several), *Eubolia cervinata* (2 males), *Scoparia ambigualis*, *Scopula olivalis*, *S. prunalis*, *Botys ruralis*, *Ebulea sambucalis*, *Spilodes verticalis*, *Crambus inquinatellus*, *Nephopteryx spissicella*, *Pempelia palumbella* (1), *Rhodophæa marmorea* (1), *Peronea sponsana*, *P. comparana*, *Aspis udmanniana* (1), *Pædisca profundana*, *Semasia wœberiana*, *Depressaria umbellana* (1), *Bryotropha terella* (1). Besides these new species I took the following additional specimens of species already recorded, viz.:—*Nudaria mundana* (several), *Odonestis potatoria* (several males), *Stauropus fagi* (1 male), *Notodonta dictæoides* (1), *N. trimacula* (several males), *Tapinostola fulva* (2), *Charæas graminis* (1 male), *Luperina cespitis* (1 male), *Stilbia anomala* (4), *Noctua depuncta* (2 males), *N. c-nigrum* (1), *N. brunnea*, *Pachnobia rubricosa* (several), *Dasycampa rubiginea* (2), *Calymnia affinis* (1), *Dianthœcia capsincola* (1), *Asteroscopus sphinx* (2 females, males of course numerous), *Plusia chrysitis* (1), *Selenia lunaria* (3 males), *S. tetralunaria* (numerous males), *Himera pennaria* (1 female, males numerous), *Boarmia repandata*, var. *conversaria* (2 males and 1 female), *Geometra papilionaria* (5 males), *Acidalia imitaria* (3), *Lobophora carpinata* (numerous), *Anticlea nigrofasciaria* (several), *Tinea semifulvella*. The following, which were plentiful in 1893, were scarce in 1894, viz.:—*Pœcilocampa populi*, *Neuronia popularis*, *Luperina testacea*, *Noctua festiva*, *N. xanthographa*, *Cerastis vaccinii*, *Cidaria silaceata*. The following were exceptionally numerous in 1894, viz.:—*Pachnobia rubricosa*, *Anchocelis pistacina*, *A. lunosa*, *Selenia tetralunaria*, *Cleora lichenaria*, *Hybernia leucophæaria* (in spring), *H. aurantiaria* (in autumn), *Oporabia dilutata* (the last two species in hundreds), *Lobophora carpinata*, *Anticlea nigrofasciaria*. The traps were set in exactly the same places as in 1893.—E. F. Studd; Oxton, Exeter, Feb. 21st.

Nyssia hispidaria, &c.—When digging on March 7th I obtained a reddish pupa, under a very young elm, bordering a yard. Not knowing what it was, I put it, as usual, with my other pupæ, into the breeding-cage. The following morning, on looking to see if anything had emerged during the night, I found a moth quite new to me, and after looking it up found it to be *Nyssia hispidaria*, which is, I believe, a species new to the Gloucestershire list. Is it not rather peculiar to find the pupa of this species at the roots of elm? I also found a larva of *Cossus ligniperda* under oak in an earthen cocoon; the larva was about half-grown, and was not at all sleepy as if hybernating. Can any one explain this?—C. J. Nash; Standish Vicarage, Stonehouse, Glos.

Hybernia leucophæaria, &c., in January, 1895.—The present season has not, so far, given many opportunities for either insects or collectors to emerge. There were a few hours' mild weather on Jan. 20th, and an afternoon's search round oak-trunks reavealed the presence of many males of

Cheimatobia brumata that looked as if they had been out for some time; also of two males of *Hybernia leucophæaria*, one perfect, the other wofully crippled. A larva of *Cleora lichenaria* was sunning itself on a tuft of its food, which it could well do without making itself unduly conspicuous. Since then we have had a fair specimen of an arctic winter; and if insects have been on the move the collector has not. Jan. 20th is an early date for *H. leucophæaria*, but in mild seasons it is usually out by the end of the month. Larvæ of *C. lichenaria* seem to be on the move all the winter.—CHARLES VIGGERS; 36, Hardinge Road, Ashford, Kent, Feb. 18th, 1895.

I took a male *Hybernia leucophæaria* off Dene Park fence, near Shipbourne, on January 17th, although only five days previously there was skating.—D. P. TURNER.

[The above notes are interesting, as they record the appearance of lepidopterous life during a few days' break in the great frost of 1895.—ED.]

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*Feb. 20th*, 1895.—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. W. M. Christy exhibited specimens of *Lycæna agestis*, caught in Sussex last summer, which had a white edging round the black discoidal spot. He said the specimens might, perhaps, be identical with the northern form of the species known as the variety *salmacis*. Mr. H. Goss exhibited a small collection of Lepidoptera from the South of France, made by Mr. Frank Bromilow. Amongst the species exhibited were the following:—*Heterogynis penella*, Hb., *Zygæna stæchadis*, Bkh., *Apamea testacea*, Hb., *A. dumerilii*, Dup., *Luperina matura*, Hufn., *Grammesia trigrammica*, Hufn., *Caradrina exigua*, Hb., *Calophasia platyptera*, Esp., *Eucrostis olympiaria*, H.-S., *Nemoria pulmentaria*, Gn., *Acidalia subsericeata*, Hw. (var. *mancuniata*, Knaggs), *A. filicata*, Hb., *A. rubiginata*, Hufn., *A. marginepunctata*, Göze, *A. imitaria*, Hb., *Boarmia consortaria*, F., *Ematurga atomaria*, L., *Aspilates ochrearia*, Rossi, *Cidaria fluviata*, Hb., *C. riguata*, Hb., *C. basochesiata*, Dup., *C. rivata*, Hb., *C. bilineata*, L., *C. vitalbata*, Hb., *Eupithecia oblongata*, Thnb., *E. pumilata*, Hb. (var. *tempestivata*, Z.), *Botys chermesinalis*, Gn. (var. *ostrinalis*, Hb.), *B. cespitalis*, Schiff., and *Adela australis*, H.-S. Professor Meldola invited discussion upon the address delivered by Mr. Elwes, as retiring President, on the Geographical Distribution of Butterflies, at the last Annual Meeting. He remarked that he had not himself had time to consider the paper in an adequate manner, but he thought that the discussion might lead to a useful expression of opinion if the speakers would deal with the question as to how far the scheme of distribution advocated by Mr. Elwes was borne out by a comparison with other orders of insects. He was of opinion that in considering schemes of geographical distribution, the results arrived at were likely to be of greater value the wider the basis on which they rested, and he therefore suggested that the question might also be taken into consideration as to how far it was justifiable to draw conclusions from the consideration of one division or one order only. He did not offer these observations in a spirit of adverse criticism, but simply with the object of setting the discussion going. Dr. Sharp remarked that geographical distribution consisted of two divisions—firstly, the facts; secondly, the generalisations and deductions that may be drawn from them. He thought that as regards insects generally our knowledge of the facts was not yet sufficient to warrant many generalisations. Still the impressions of those who have paid attention to particular groups of insects are even now of some importance, though at present based on incomplete knowledge. He thought the Rhopalocera would prove to be a somewhat exceptional group in their distribution. Notwithstanding that Australia and New Zealand are so poor in them, this was by no means the case with their Coleoptera, Australia being very rich, and its fauna of Coleoptera being very distinct. He thought that if Lepidoptera generally were well collected in Australia and New Zealand, it would be found that this order was not so poor in species as was supposed. He instanced the case of the Sandwich Islands, where it was supposed that there were very few species of Lepidoptera, and yet some five hundred species, or perhaps more, had been recently found there by Mr. R. C. L. Perkins, who had been sent to investigate the Natural History of the islands by a committee appointed by the Royal Society and the British Association. Mr. McLachlan said he was of opinion that no definite demarcation of regions existed, but that all the regions overlapped; in any case, the retention of Palæarctic and Nearctic as separate provinces was not warranted on entomological data. He thought that at the close of the glacial period some insects instead of going north were dispersed southwards, and that the present geographical distribution of some forms might thus be accounted for. The discussion was continued by Mr. Osbert Salvin, Mr. J. J. Walker, Herr Jacoby, Mr. Champion, Mr. Elwes, and Professor Meldola. The Rev. T. A. Marshall contributed a paper entitled "A Monograph of British Braconidæ, Part VI." Mr. J. W. Tutt read a paper entitled "An attempt to correlate the various Systems of Classification of the Lepidoptera proposed by various authors." In this paper he criticised the opinions recently expressed by Mr. G. F. Hampson and Dr. T. A. Chapman, in certain papers published by them. A discussion ensued.

March 6th.—Professor Raphael Meldola, F.R.S., President, in the chair. The following gentlemen were elected Fellows of the Society:—Mr. H. T. Dobson, of Ivy House, Acacia Grove, New Malden, Surrey; Mr. Herbert Massey, of Fairfield, Fog Lane, Didsbury, Manchester; Mr. Thomas M. McGregor, of 30, North Methven Street, Perth, N.B.; Mr. Sidney Crompton, of Salamanca, Santa Cruz, Teneriffe; Mr. Benjamin Hill Crabtree, of The Oaklands, Levenshulme, Manchester: and Mr. G. A. K. Marshall, of Salisbury, Mashonaland, S. Africa. Mr. B. G. Nevinson exhibited a long series of *Heliothis peltigera*. He stated that the specimens were bred from larvæ found on the Dorsetshire coast during July, 1894, feeding on the flowers of *Ononis arvensis*, which were extremely luxuriant: a few also were taken on *Hyoscyamus niger*. He added that all the larvæ went down by the end of July. The first emergence took place on August 20th, and they continued coming out at the rate of about five a day, through the rest of that month and September; only five emerged in October, and the last one appeared on November 11th. Mr. Nevinson said that not one larva was ichneumoned, and only three or four imagines were crippled. Mr.

G. T. Bethune-Baker, Mr. Eustace Bankes, Mr. B. A. Bower, the Rev. Seymour St. John, and Mr. H. Goss made remarks on the habits and distribution of the species in England. Mr. Bower exhibited a variable series of *Scoparia basistrigalis*, Knaggs, showing light, intermediate, and dark forms, taken at Bexley, Kent, from 12th of June to 7th of July, 1891–94. He said the species appeared to be poorly represented in collections, and when present was almost invariably misnamed. Mr. Eustace Bankes commented on the rarity of the species, and said the specimens exhibited formed the most interesting collection of it and its varieties which he had ever seen. Lord Walsingham exhibited larvæ of *Pronuba yuccasella*, which he received more than four years ago from Colorado, and which were still living. One specimen of the moth had emerged two years ago. Mr. Goss exhibited, for Mr. G. C. Bignell, a pupa of a Tortrix with the larval legs, and also a specimen of a sawfly, *Emphytus cinctus*, L., with eight legs. Mr. G. H. Verrall and Mr. McLachlan made some remarks on the latter species, and as to the insertion of the fourth pair of legs. Professor Meldola exhibited a wooden bowl from W. Africa, from which, after arrival in this country, a number of beetles (*Dermestes vulpinus*) had emerged. Specimens of the latter were also exhibited. It was not clear to the exhibitor whether the larvæ had fed upon the wood, or had simply excavated the cavities which were apparent in the interior of the bowl for the purpose of pupating. Mr. McLachlan, Mr. J. J. Walker, Herr Jacoby, and Lord Walsingham made some remarks on the habits of *Dermestes*, and it was generally considered that the larva of *D. vulpinus* excavated the wood for the purposes of pupation, and not for food. Mr. Kirkaldy called attention to and exhibited three volumes of an important new work, by Dr. McCook, on 'American Spiders.' Mr. Champion read a paper entitled "On the Heteromerous Coleoptera collected in Australia and Tasmania by Mr. J. J. Walker, R.N., during the voyage of H. M. S. 'Penguin,' with descriptions of new genera and species. Part II." Mr. Walker and Mr. Gahan made some observations on the distribution of some of the species described. Mr. Roland Trimen contributed a paper entitled "On some new Species of Butterflies from Tropical and extra-Tropical South Africa." Mr. G. A. James Rothney contributed a paper entitled "Notes on Indian Ants," and sent for exhibition a number of specimens in illustration of the paper, together with nests of certain species.—H. Goss, *Hon. Sec.*

South London Entomological and Natural History Society.—*February 28th*, 1895.—Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Beauman, 18, Victoria Road, S.W., was elected a member. Mr. Edwards exhibited larvæ of the Dipteron *Eristalis tenax*, L., found in some water in the stump of an old apple-tree. Mr. Adkin exhibited a series of *Crambus ericellus*, Hb., from Sutherland. It was stated that this species differed from *C. pascuellus* in always having the silvery stripe narrow and even. Mr. Tutt exhibited continental specimens of *Xanthia ocellaris*, and pointed out the features distinguishing it from *X. gilvago*, viz.:—(1) the lower part of the reniform stigma was white; (2) the nervures were well dotted with white scales; (3) the apex of the wing was different. Mr. Tutt also read a paper entitled "*Lithosia lutarella*, L., and its varieties," illustrating it by a magnificent series from Deal and the Alps.

March 14*th*.—The President in the chair. Mr. E. C. Rye, of Fulham, was elected a member. Mr. Frohawk exhibited a magnificent bred series of *Vanessa c-album*, L., showing both light and dark forms of male and female from one batch of ova; a discussion ensued, in which it was suggested that the pale form was the one which produced a second brood, while the dark form went early into hybernation. Mr. Adkin, a series of *Melanippe hastata*, L., from Sutherland, intermediate in coloration between the usual southern and northern forms. Mr. Sauzé, a specimen of *Œdipoda tartarica*, taken among imported garden produce at Brixton. Mr. T. A. Hall, a Pierine butterfly, *Ithonia patilla*, with Danaine mimic *Dismorphia fortunata*, from Nicaragua. Mr. Edwards, four varieties of the female of *Papilio memnon*, *P. segonax*, *P. westwoodii*, two *P. epycides*, two *P. anticorates*, and *P. pammon* var. *javanana*.—Hy. J. Turner (*Hon. Report Sec.*).

Birmingham Entomological Society.—*February* 18*th*, 1895.—Mr. G. T. Bethune-Baker in the chair. A letter was read from Mr. G. H. Kenrick, requesting to be relieved of the office of President for the present year; Mr. G. T. Bethune-Baker was therefore elected President in his stead, and Mr. P. W. Abbott to the office of Vice-President thus left vacant. The following were exhibited:—By Mr. Bethune-Baker, a number of Lepidoptera, including English *Lælia cænosa*, and *Acidalia contiguaria; Aporophylla lutulenta* var. *sedi*, from Ireland; *Noctua depuncta;* very dark *Acronycta ligustri*, from Llangollen; some beautiful brown forms of *Rumia cratægata;* and other nice varieties and rarities. By Mr. R. Freer, a number of varieties, chiefly from Cannock Chase; among others were a *Rumia cratægata* of a lovely pale or yellow orange colour, deeper along the costa, from the Chase; *Ennomos angularia*, several varieties from Hyde Park, one male of a uniform fuscous colour, with pale fuscous hind wings and yellow thorax and head; *Notodonta dictæa*, one from the Chase, of a delicate pale brown without white in any portion; a specimen of *Noctua festiva*, of the form called *conflua* by Newman, from the Chase; a brilliant orange specimen of *Xanthia aurago* from Ashford, Kent; and varieties of *Notodonta dictæoides*, *Asphalia flavicornis*, *Diloba cæruleocephala*, &c. By Mr. C. J. Wainwright, a box of Lepidoptera, including some nice *Acronycta leporina* var. *bradyporina*, one from Knowle being very dark and suffused. By Mr. E. C. Rossiter, a number of Lepidoptera, chiefly from Arley, including a specimen of *Lycæna alexis*, very chalky, and closely approaching *L. corydon* in colour, with a white spot in the centre of each wing; a fine dark *Cleora glabraria* from the New Forest; and other varieties, &c. By Mr. R. G. B. Chase, *Dianthæcia conspersa*, from Lundy Isle. By Mr. P. W. Abbott, bred series of *Hadena suasa* from Hull, *Sesia culiciformis* from Market Drayton. By Mr. R. C. Bradley, a rose-bush covered with empty cases of *Coleophora gryphipennella*, from his garden at Sutton; also *Orthosia suspecta* from Barnt Green.—Colbran J. Wainwright, *Hon. Sec.*

Lancashire and Cheshire Entomological Society.—*March* 11*th*, 1895.—Mr. S. J. Capper, F.E.S., F.L.S., President, in the chair. Mr. R. J. Thompson was elected a member of the Society. Mr. R. Newstead, F.E.S., Curator of the Grosvenor Museum, Chester, read some "Observations on Insects found in Birds' Stomachs." The lecturer gave a résumé of some 450 post-mortem examinations of birds which he had obtained from various parts of Cheshire during a number of years. Of the many records, the Coleoptera were by far the most numerous, this being due to the fact that their hard elytra are not assimilated so rapidly as are the softer Diptera or Lepidoptera. Many species of Geodephaga were found in the rook, jay, wagtail, and other birds. *Dytiscus punctulatus* and *Helophorus aquaticus* were the only species of the Hydrodephaga observed. Of the latter species about 150 specimens were found in a golden-eye duck (*Glangula glaucion*); the same insects also occurred in several other birds. The Brachelytra were only represented by two or three species, found only during hard weather. The Aphodii were frequently observed; *A. punctato-sulcatus* in many birds; also *A. fimetarius* in the starling. A night-jar (*Caprimulgus europæus*) had regaled itself with six specimens of *Geotrupes stercorarius*, five of which were found almost perfect. Although the hard coverings of the Curculionidæ (Rhyncophora) are said to save them from attack (' Darwinism,' p. 260), these insects far outnumbered the other Coleoptera; the names of several species were given, including *Sitones*, *Phyllobius*, *Apion*, &c. The finding of *Phyllotreta undulata* and *P. nemorum* is of economic importance; three records of these were given, all from the tree-creeper (*Certhia familiaris*). During severe weather two specimens of *Forficula* were found. From this fact it was suggested that these insects are nauseous. Of the Hymenoptera, the discovery of two specimens of the larvæ of a species of *Tenthredo* in the cuckoo was of the most importance. Several species of Ichneumonidæ, numerous specimens of a species of *Cynips*, and two species of *Formica* were also recorded. Larvæ and imagines of the Lepidoptera occurred frequently, but could rarely be identified. Larvæ of *Abraxas grossulariata* in the cuckoo were the most important finds in this order. Psyllidæ, Aphidæ, and Coccidæ were found in several species of the Paridæ; three species of Coccidæ were determined. The Diptera were largely represented, but, like the Lepidoptera, they too were most difficult to determine. The President exhibited a fine series of varieties of *Smerinthus tiliæ;* Mr. Watson, the rare *Papilio bairdii* and its pupa; Mr. H. B. Jones, Lepidoptera from the West Coast of Africa; and Mr. R. J. Thompson, exotic Coleoptera found in imported timber.—F. N. Pierce & A. B. Jones, *Hon. Secs.*

RECENT LITERATURE.

Report of Observations of Injurious Insects and Common Farm Pests during the year 1894, *with Methods of Prevention and Remedy.* By Eleanor A. Ormerod. Pp. viii, 122, and Appendix. London: Simpkin, Marshall & Co. 1895.

It would appear from this Report that the year 1894 was not marked by any widespread or very serious insect attack, although nearly all kinds of crop and orchard insect-pests were present during the season. To the lepidopterist it will seem curious to find the larvæ of such species as *Vanessa polychloros*, *Smerinthus ocellatus*, and *Gastropacha* (*Lasiocampa*) *quercifolia*, referred to as inimical to the fruit-grower's prospects. In another case, that of *Sesia tipuliformis*, some currant-bushes in Scotland were so badly infested that the growers determined to grub up and destroy every bush. At the conclusion of her remarks on the *S. ocellatus* attack Miss Ormerod says:—"It would often be the best way towards getting rid of them [the larvæ] to let some neighbouring collector of entomological specimens know of their presence." This is an excellent suggestion, and it is to be hoped that in future when any grower finds the foliage of his trees being devoured, or the stems and twigs tenanted, by unusual caterpillars, he will call in the assistance of a local collector of moths, as we are certain that such a course would be to the mutual advantage of both parties.

The Appendix to this Report is devoted to a lengthy consideration of *Hypoderma bovis*, the warble or ox bot fly. All the most important results of a long series of observations on this troublesome pest are brought together in connected form, and an account is given of the treatment found to be most efficacious in preventing attack or in curing the animals when affected. There is also a great deal of statistical information respecting the loss resulting from perforated hides and from "licked beef," a product of the warble attack.

The Cabbage-Root Maggot: with Notes on the Onion Maggot and Allied Insects. By M. V. Slingerland. Bulletin 78, Cornell University Agricultural Experiment Station, Entomological Division. Nov., 1894.

Deals more especially with that common garden insect the cabbage-destroying *Phorbia brassicæ*, Bouché, so well known, at least by its results, to growers of cauliflowers, cabbages, &c. Miss Ormerod ('Manual of Injurious Insects,' 1890) gives a concise life-history of this insect nuisance, and discusses remedial measures. In the report under consideration, a mass of information, largely original, is presented. Of the different methods, about seventy in number, recommended for preventing or fighting the attack, Mr. Slingerland considers that only some half-dozen are likely to be effective, and these he classes under two heads—A. Preventive, and B. Destructive. The preventive measures are:—(1) growing the plants in covered frames; (2) encircling the stems of plants in the open by tarred rings of paper or card,—these resting on the ground prevent the flies from depositing their eggs in a suitable position on the cabbage- or cauliflower-stem. The destructive methods are:—(1) rubbing the stems of the plants with the fingers so as to clear off the eggs,—this must be done every few days; (2) picking off the larvæ by hand,—this means taking up the plant, examining its roots, and then replanting it; (3) syringing the roots with, or otherwise applying, "insecticidal substances." All these methods of coping with the scourge in its various stages seem to be practical enough, and, if adopted, should put an end, at least for the time being, to the trouble. Two or three insect foes afford valuable assistance in the work of suppression, and this is an important fact which those who wage war against the pest will do well to remember. We are inclined to think that, often because the operator is unable to distinguish a friend from an enemy, useful and noxious insects are alike destroyed.

THE ENTOMOLOGIST

Vol. XXVIII.] MAY, 1895. [No. 384.

EMMELESIA TÆNIATA.

By J. B. Hodgkinson, F.E.S.

Larva of *Emmelesia tæniata.*

This very variable species, of which really good specimens are rarely to be obtained, generally occurs in damp woods, and when disturbed darts into dark places. It is very uncertain in its time of appearance. Once or twice I have captured some scores in a day. It seems especially numerous, or at least easy to take, after a thunder-storm, when it has been driven down among the laurel-trees for shelter.

First taken in 1825, by the late Mr. J. C. Dale, at Castle Eden Dene, Durham, it has since been met with at Dovedale in Derbyshire; at Flimby, near Maryport, Cumberland; and by the late Mr. Murton at Silverdale in Lancashire. I have myself taken it on the top of Whitbarrow, Witherslack, and on the Lancashire side of Windermere Lake; it is also recorded from Ireland.

The moth appears from the middle of June to the end of July. The larva hatches about six weeks after the egg is deposited, goes into hybernation when about a quarter of an inch long, and commences to feed again in April on the fruit of any of the mosses, but perhaps more frequently on a species of *Bryum* which grows in wet places. The following is a brief description of the larva:—

Length five-eighths of an inch. The upper portion of body is fairly hairy or spiny, light brown in colour, with a dorsal row of deeper brown diamond-shaped marks and a series of six black dots; lateral stripe pale yellow; head and under side of body pale ashy.

The diamond marks remind one of a "pug" larva, and the black dots are very distinct and striking. The entire series of metamorphoses, from the laying of the egg to the emergence of the perfect insect, occupy a period of about ten months.

[The figure at the head of this article has been drawn by Mr. Frohawk, from a rough sketch made by Mr. Hodgkinson some years ago.—Ed.]

ON THE CAUSES OF VARIATION AND ABERRATION IN THE IMAGO STAGE OF BUTTERFLIES, WITH SUGGESTIONS ON THE ESTABLISHMENT OF NEW SPECIES.

By Dr. M. Standfuss, Lecturer in both Academies at Zürich. Translated by F. A. Dixey, M.A., M.D., Fellow of Wadham College, Oxford.

(Concluded from p. 114.)

8. *Vanessa cardui*, L. (Larvæ all from Zürich.)

a. Warmth.

(1) Immediately after pupation, 6 hours at 40° C. (104° F.), then 12 hours at the normal temperature (about 22° C., 72° F.), then once more 6 hours at 40° C. (104° F.), afterwards at the normal (about 22° C., 72° F.), until emergence in 10—12 days after pupation.

Out of 42 pupæ, 28 butterflies came out good specimens. Of these, 26 had the normal colouring, and 2 belonged to ab. *elymi*, Rbr.; of the remainder, 12 were crippled, 10 being normal and 2 ab. *elymi*, Rbr., and 2 pupæ perished.

(2) Sixty hours at 36°—37° C. (97°—98° F.), then the normal temperature up to the time of emergence, 6 or 7 days after pupation.

An extraordinarily pale form, like those presented to the entomological museum of the [Zürich] Polytechnicum from very different parts of the tropics,—for instance, from the German colonies in East and West Africa.

Upper surface.—The red colouring, which in the greater number of specimens takes on a brownish tinge, becomes increased in extent on both fore and hind wing.

The three black spots forming a diagonal band across the fore wing become considerably reduced, and in many individuals the whole of the dorsal margin is coloured red, besides which the base of the wing, which is usually conspicuously darker, is rendered much lighter by the prevalence of red scales.

In the same way the hind wing becomes predominantly reddish brown. The four or five spots which correspond to the ocelli on the under surface never show, in this form, blue scales in their centres.

Under side.—Here also, as on the upper surface, all the blackish-brown colouring is diminished in consequence of an increase in the tints of red and reddish brown.

The pattern of the apex of the fore wing and of the whole of the hind wing, which both follow the same scheme, also becomes considerably lighter, but there is no noteworthy difference in the individual features of the pattern.

b. Cold. (Larvæ again all from Zürich.)

(1) Twenty-three days refrigerator, then 12 days longer at the normal temperature.

This gave rise to a very recognisable darkening of the whole insect, on both surfaces of each pair of wings.

Most of the specimens resemble a form received by me from Lapland, from the natural history dealer Kricheldorff, of Berlin, now dead.

A number of specimens go further than this form along the same line of development.

Upper surface.—The blackish-brown constituents of the pattern in the fore wing encroach far upon the red area, this latter in many specimens acquiring a tinge of light carmine. Moreover, those parts of the wing that remain red become shaded over with a rich besprinkling of blackish-brown scales, only one red spot before the end of the central cell being unaffected by this overclouding.

The large white costal spot is also in some specimens darkened by a powdering of blackish-grey scales.

The hind wings correspond in character to the fore wings. A small spot before the end of the central cell is the only one in the basal region that invariably remains red; the portion of the wing, however, between the row of [submarginal] spots and the outer margin does the same.

There is in these forms a frequent centring of the spots with greyish-blue scales, especially towards the anal angle.

Under side.—In most specimens the elements of the pattern are changed very slightly, or scarcely at all; the whole of the yellowish and light brown colouring, however, becomes much darker, whilst those parts that are almost white remain un-changed throughout, thus giving rise to a very abrupt and vivid contrast.

(2) Twenty-eight days refrigerator, the perfect insects emerging at the normal temperature 10 days afterwards. The butterflies, 33 per cent. of which were crippled, showed on the whole no difference worth speaking of from the series just described. The only noticeable point is that a small number were still darker than the most extreme specimens of the previous series.

9. *Argynnis aglaia*, L.

a. Warmth.

Four days at 36° C. (97° F.), then 1—2 more days at the normal temperature until the butterflies appeared.

These show—in the female as well—a very light reddish-brown ground colour on the upper surface, but no noteworthy modification of the black markings.

Again, on the under side the elements of the pattern are not altered in outline; nevertheless the greyish-green shades which occur at the base of the wing and just internally to the silver spots of the outer border are darker in tone, and stand out much more conspicuously than in average specimens.

b. Cold.

(1) Twenty-eight days in the refrigerator, then 12 days at the normal temperature until the butterflies appeared. Twenty-one pupæ yielded only three perfect insects; the remaining pupæ either perished or gave rise to crippled specimens.

The reddish-brown ground colour is unaltered. The black spots at the base of the fore wing increase in size; not so, however, the series of spots lying further out, nor the markings of the outer margin, nor again the pattern of the hind wing. On the under side of the hind wing the greyish-green shades, which I have already described in their place, take on a tinge of brown.

(2) Forty-two days in the refrigerator, then 16 days at the normal temperature.

Of 12 pupæ, 10 yielded no butterfly. The two that emerged are both aberrant, and both in the same direction.

Upper surface.—The reddish-brown ground colour becomes duskier, and the basal spots are enlarged. The root of the wing below the central cell is blackened. The series of spots which lie further out begin on both pairs of wings to dwindle. The spots lying in a curved series adjacent to the outer border of both fore and hind wing are prolonged in a conical form inwards.

Under surface.—The constituents of the pattern on the fore wing become larger or smaller in correspondence with those on the upper surface.

On the hind wing the greyish green between the three silver spots on the costal margin is darkened to a blackish brown; in other places also this darkening occurs at the edge of the silver spots; otherwise these show no substantial deviation from normal specimens.

10. *Dasychira abietis*, Schiff.

a. Warmth.

Sixty hours at 37° C. (98°—99° F.) killed 18 pupæ of this species so quickly that not one of them showed anything even approaching a perfect insect.

b. Cold.

Forty-two days refrigerator, then 12—15 days at the normal temperature, 6 male and 6 female pupæ gave 1 male and 4 females, all perfectly developed. In the remaining 7 pupæ the imago was fully formed, but did not emerge.

The blackish-brown scales besprinkled over the light ground colour are increased in amount. Moreover, the few scattered shades towards the anal angle of the hind wing are darker and more sharply defined.

From the facts now adduced it should be sufficiently clear that the influence of temperature in the pupal stage operates upon the aspect of the resulting perfect insect in an eminently definite manner. This, it is true, is clearly recognisable only in respect of the colouring and marking of the wings, but it is at times certainly visible in the shape as well.

In the first place we witness in part, by the experiments here communicated, the production of "seasonal forms" (as in the case of *V. c-album*, and to some extent in that of *P. machaon*); forms, that is, with a similar aspect to those that occur among the palæarctic fauna at certain definite seasons of the year.*

Secondly, there arise in part local forms and races; forms, that is, that occur constantly in certain definite localities, as in the case of *V. urticæ*, *V. cardui*, and to some extent *P. machaon* and *V. antiopa*.

In both of these results we have to deal with forms which, under the received nomenclature of the present day, come within the definition of "varieties," inasmuch as they constitute deviations from the types of the species which have become constant, and which keep to definite times of year (seasonal forms) or localities (local races).

Thirdly, there seem to arise forms of an entirely similar aspect to some which also occur exceptionally here and there at the present stage of the earth's history—that is to say, "aberrations."

---

* It should here be mentioned that autumnal pupæ ought also to be submitted to these experiments, as was done by Weismann in the methodical conduct of his investigations. The experiments discussed above were only undertaken with summer pupæ.

Examples of this, from the experiments above recounted, are furnished by certain forms of *V. io*, *V. cardui*, and *Argynnis aglaia*.

It is accordingly in a high degree probable that a large number of the aberrations that occur in nature, of which the immediate causes have hitherto seemed so strangely obscure and incomprehensible, may have arisen by the influence of abnormal temperature-conditions on the pupal stage.

Nevertheless I should certainly not like to lay this down even as a probable law controlling all aberrations. There are undoubtedly a large number of aberrations which are not in any way connected with the conditions of temperature which have befallen the pupa. There is no reason at all why the special aspect of the perfect insect should be exclusively the result of antecedents belonging to the pupal condition.

Fourthly, these experiments give rise to *phylogenetic* forms; forms, that is, which are nowhere to be found on the earth at the present day within the compass of the species, but which may either have existed in past epochs, or may perhaps be destined to arise in future.

The first, which may be called "obsolete forms," show an approximation of these to other species which are their nearest relatives, and from whose ancestors they have been separated during past ages.

According to the above researches this separation resulted probably from the operation of a constant increase or decrease of temperature on the species in question during long periods of time. Such an influence may have been brought to bear through the modification of temperature-conditions having taken place in the actual habitat of the species, or from the species having migrated into a more southerly or northerly region. From the material discussed above, I may adduce as examples certain cooled forms of *V. io* and *V. antiopa*, and certain warmed forms of *V. atalanta*.

The second, *i. e.*, possible forms of the future, are further removed from the type of the related species, thus contrasting with the first kind of "phylogenetic forms" (certain warmed forms of *V. antiopa* and certain cooled forms of *V. atalanta*).

It is assuredly most remarkable that, as our experiments show, the very same conditions will lead to the transformation of one species into its varieties, and of another species, to some extent, into forms that manifest a most striking approach to those of other types.

It is therefore impossible to adopt any fundamental distinction between species and variety on the one hand, or between species and species on the other.

Should the question be asked, How does it happen that in the foregoing experiments one species becomes transformed entirely within the limits of its variation as observable at the present day, while another species far transcends those limits, the answer may be given as follows: that those species which have already existed on the earth for very long periods of time either under their present aspect or under one very closely resembling it—in short, the phylogenetically older species—come under the first category; on the other hand, those species that have only possessed their present aspect for a considerably shorter time—that is, the phylogenetically younger species—belong to the second category.

To demonstrate the high probability of this supposition would lead us too far from our present subject.

I must not omit to mention that the modifications induced by these experiments cannot all be classed under the four headings so far given; there is, in fact, a small unexplained residue, constituting a fifth group, which possibly represents the completely independent reaction of the individual species, uncontrolled by any inherited developmental tendency, to the influences brought to bear upon it. We must not forget that agents were employed that in nature never, or only most exceptionally, operate upon these creatures with such intensity. Still, as the short span of human life does not allow any one man to expose methodically for successive centuries (which alone would give any prospect of results) generation after generation of such creatures as are suitable for experiments of this kind to conditions which may be expected to have an effective influence, and which are actually to be met with here and there upon the earth, the only course that remains open for the experimenter is to intensify the conditions which determine the changes of the organic world, and to take the sum of the series instead of the terms of the series at length.

As above stated, I had already in 1892 (Entom. Zeitschr., Guben, Dec. 1st, 1892) clearly hinted at the phylogenetic character of one of these forms, and had then signified my intention of publishing further details at the earliest opportunity.

This explanation of the forms now in question has perhaps been offered for the first time in all entomological literature by myself.

In order to avoid reasoning from inadequate data, and other forms of error, which are only too apt to be induced by accidental peculiarities of the material subjected to experiment, or by performing the experiments on an insufficient number of species, I have during the last few years tested the influence of temperature on over 5000 pupæ—3000 or so in the present year alone.

It was proved in the course of this work that experiments with raised temperatures were very difficult, since the great number of species hitherto tested showed themselves to possess small powers of resistance to high degrees of warmth (40° C., 104° F., rapidly caused death in almost all species, *P. machaon* and *V.*

c-album proving the least sensitive), so that an enormous amount of material had to be sacrificed before any laws could be deduced from experiments in this direction.

On the other hand, low temperatures for even four weeks were much better tolerated. These circumstances point to the conclusion that the species tested were constrained in past ages to accommodate themselves much more to lower than to higher temperatures.

In the face of these difficulties it would have been even now impossible for me to undertake the management of such a vast mass of material without the faithful and intelligent help of my wife.

It is clear that these experiments are capable of being varied indefinitely, and of being performed in other ways than those here described on the species discussed, or on other species besides these, especially those Heterocera that emerge after a short pupal period, thus opening up an excellent field of work for entomological study. It is also in the highest degree probable, according to the results now communicated of the influence of temperature on the pupa, that in the temperature-experiments recorded under the previous heads of "Egg" and "Larva" the influence upon the aspect of the resulting imago could be either intensified, checked, or perhaps even reversed according to the degree of temperature to which the pupa was finally exposed in such experiments.

In the Trans. Ent. Soc. Lond., 1893, pp. 55–67, with pl. iv., and again pp. 69—73, this subject is more fully treated.

Mr. Frederic Merrifield there publishes his very careful experiments made with different temperatures on the pupæ of *Pieris napi*, L., *Polyommatus* (*Chrysophanus*) *phlœas*, L., *Vanessa atalanta*, L., and *Zonosoma* (*Ephyra*) *punctaria*, L.

Mr. Merrifield has also repeatedly published very laborious researches in the same subject in previous volumes of the 'Transactions,' and in the last volume (that for 1894) has added more. He varied these experiments in very different ways, and I much regret that extreme pressure of work precludes me from giving here a more detailed account of them.

The following, however, must be mentioned:—With respect to *V. atalanta*, Mr. Merrifield made observations closely similar to mine; but it is especially worthy of note that pupæ of *P. phlœas* and *Z. punctaria*, of which the former had lain for ten weeks and the latter for three months in the refrigerator, being immediately afterwards exposed to the influence of a temperature of 87°—90° F., gave rise to perfect insects almost exactly resembling those produced by pupæ of each species that had been immediately exposed to these high temperatures without any sojourn in the refrigerator.

In connection with the results of Mr. Merrifield's experiments on *V. atalanta*, Dr. F. A. Dixey discusses the question of phylogeny. He finds phylogenetic relations between the heat-modification of *V. atalanta* and *V. callirrhoë*, F., &c.; also between the cold-modification of *V. atalanta* and *Grapta c-aureum*, L., *Pyrameis gonerilla*, F., &c.

And now, in conclusion, a few words as to the influence of moisture on the pupa.

In my 'Manual,' pp. 124, 125, the fact is recorded that out of a large series of pupæ of *Endromis versicolor*, L., *Saturnia pavonia*, L., and *Aglaia tau*, L., I had a few emergences without previous hybernation of the pupa. The aspect of the individuals belonging to the first two species was markedly altered.

The numerous temperature-experiments of the last few years just recorded, which resulted in so remarkably evident a reaction of the species selected for experiment, lead unquestionably to the conclusion that a case of this kind is not purely a matter of innate or primary tendency on the part of individuals whose constitution is biologically abnormal, but rather that some external factor must here have been brought into play.

Since then I have made the following observations. Large numbers of pupæ of *Saturnia* (in these cases from 200 to 400 specimens were used) were kept very dry for 7—10 weeks from June to the end of September. They were then freely and repeatedly moistened, and about 1 per cent. of the moths emerged from these pupæ 10—20 days after the damping.

The fully-developed moths mostly show a departure from the ordinary form of the species, which may be characterised as follows: the elements of the pattern are not sharply outlined, but more or less washed-out and confused.

As I have frequently repeated this experiment with the same result, it cannot possibly be a matter of mere chance; and the facts already mentioned in my 'Manual,' and given at length above, may be referred to similar causes which were disregarded at the time.

Further, on a comparison of these observations it seems probable that similar conditions in nature may have similar results, *i. e.*, that the exceptional appearance at midsummer or in autumn of species which as a rule do not occur at such times in the perfect state, but hybernate as pupæ, may have similar causes; that is to say, a copious rainfall after a long period of drought.

Supposing then the numbers of such abnormal individuals of a species (whose descendants must, it is true, accommodate themselves to widely different conditions of life) to be sufficient for the permanent establishment of the abnormality, then these individuals will form the starting-point for a new series of developments, which in course of time, in consequence of the impossibility of a renewed intercourse with the still unmodified individuals of the species, will constitute first a permanent variety and eventually a well-defined species.

Saturnia boisduvalii, Ev., from East Siberia and North Japan (Graeser, Berl. Entom. Zeitschr. 1888, p. 135), also *Bombyx catax*, L., and *B. rimicola*, Hb., both from Central Europe, all of which species appear as moths in the autumn and pass the winter in the egg-state, may very probably have separated by the operation of similar causes in past ages from the closely-allied Saturniidæ and Bombycidæ, which still hybernate as pupæ.

In this connection it may be mentioned that among the Palæarctic fauna there is a widely-prevailing law that species with a long pupal stage yield the perfect insect in spring or late autumn,—after a period, that is to say, of copious rainfall; whereas the summer fauna is almost entirely composed of species which undergo a rapid development from pupa to imago.

May the present communication be the means of setting on foot many researches, which will not only serve the object of filling the cabinets of entomologists with valuable specimens, but will also bring welcome contributions to the study of scientific Zoology.

[Zürich, end of August, 1894.]

RHOPALOCERA IN THE GUILDFORD DISTRICT.

By W. Grover.

As I have paid some attention to the above for several years, perhaps the following remarks thereon may not be entirely without interest, more especially as I have not seen any notes on the Rhopalocera of this district in the 'Entomologist' for some years, except a very short one (Entom. xxv. 309). The present observations refer to this immediate neighbourhood only, all the species mentioned having been taken—with one exception—in the fields and woods to the east and within four miles of the town. Although long walks in other directions have failed to produce any additional species, I cannot claim to give anything like a complete list, as I feel certain that many others are to be found, even within a four-mile radius, if worked thoroughly in every direction by any one with more time at his disposal than falls to my share.

I regret I have been unable to make use of the excellent "suggestions for recording," made in the 'Entomologist' two years ago; but, for the reason above mentioned, my chances of observation are too uncertain to be of any value for the purpose then suggested.

Of the preliminary stages I have had scarcely any experience, having bred only the very common species, such as *Pieris brassicæ*, *P. rapæ*, *Vanessa urticæ*, *V. io*, &c.

The chief geological formations in this district (from north to south, the newest to the oldest) are:—I. Lower Bagshot Sand. II. London Clay, with patches of drift gravel. III. Chalk (on which the town itself stands); the highest part of the chalk range is, in some places, capped with sand and gravel, which are in most cases covered with woodland, thus presenting a great contrast to the tracts of bare down which surround them. IV. Lower Greensand (Folkestone and Hythe beds). There is a large inlier of Atherfield and Wealden Clay in this formation; it forms a tract of low ground —much of it marshy and uncultivated—about five miles long and two wide, but it is to a great extent covered by river-gravel, &c., accumulated by the Wey, which runs in a north-easterly direction through it, and also through the whole district.

Pieris brassicæ. Very common. Some years abundant; but not so common as usual in 1893, and very rare in 1894.—*P. rapæ.* Very common every year. First seen in 1894, March 27th.—*P. napi.* Very common; but not so abundant as *rapæ.*

Euchloë cardamines. Very common in most years, but rather scarce and late in 1894; not seen before May 3rd.

Colias edusa. Fairly common in August and September, 1892, in clover fields east of the town. Not seen before or since.

Gonopteryx rhamni. Not very common. I have never seen more than twenty or thirty specimens in one season, and some years only a few. Rare in 1894.

Argynnis euphrosyne. Common, but local in woods. Out very early in 1893; first seen April 19th. Rather late and not common in 1894; first specimen seen May 4th.—*A. aglaia.* One female specimen captured August 6th, 1893.

Vanessa polychloros. Rare. One specimen, August 3rd, 1885; another, June 11th, 1886; and a third, March 10th, 1893; also two in 1894, on March 30th and April 2nd.—*V. urticæ.* Abundant every year. I bred some hundreds of this species in 1893. A few varied slightly in ground colour and in the size of the black markings, but I did not obtain anything remarkable.—*V. io.* Fairly common in most years; but only a very few seen in 1893, and none in 1894. I have bred a large number of this species at various times, but beyond a slight variation in size they were all strictly typical.—*V. atalanta.* Rather commoner than the last species. The variety with the red band on the fore wings, nearly divided a little below the middle, is as common as the type in this district. A specimen was taken at treacle about 9 p.m., August 23rd, 1886.—*V. cardui.* Not common, and not regular in appearance. A few specimens seen most years in August and September; sometimes commoner in May or June after hybernation. None seen in 1893, and only one in 1894.

Pararge egeria. Not common, and local in woods. There are at least two broods in the year, and I think sometimes three, if not four, but am unable to decide with certainty. Difficult to obtain in good condition; even freshly-emerged specimens are nearly always more or less chipped.—*P. megæra.* Common every year. On October 22nd, 1893, I saw about a dozen specimens of this species; they were all quite fresh and in good condition, possibly some of a partial third brood? Not so common as usual in 1894. During the last few years this species seems to have become far less common than it was ten or twelve years ago.

Satyrus semele. Rare. Five specimens taken and about twenty others seen, August 3rd, 1885; but not seen or heard of since, although it has been searched for every year in the same locality.

Epinephele ianira. Abundant every year in all parts of the district. —*E. tithonus.* Common, but never so abundant as the last species. Some years rather scarce.—*E. hyperanthus.* Common, but never so abundant as the two last species, and also very local. The ocellated spots on both the upper and under sides vary in size and number, but I have not seen or taken any very exceptional specimens.

Cœnonympha pamphilus. Abundant, but local. This is the most abundant species of all; hundreds may be taken on almost any day from May to October in most years. But from its small size, and also its habit of taking only short flights near the ground, it does not force itself upon our notice as do the larger and more conspicuous species.

Thecla rubi. Rather scarce. A few specimens seen flying round the tops of tall bushes of whitethorn and elder in a wood on April 19th and 22nd, 1893. Not seen in 1894.

Polyommatus phlæas. Fairly common in some years. This is a very irregular species; it was common in September, 1893, and a few also seen in May of that year; but only a single specimen seen in 1894.

Lycæna ægon. This species is the one exception mentioned. A few specimens taken July 30th, 1891. They were flying among heather on the common near Woking railway station, which is about six miles north of Guildford.—*L. astrarche.* Not very common; but it is easily overlooked among the swarms of *L. icarus.* Only noticed in one or two places on the chalk downs, where its food-plant (*Helianthemum chamæcistus*) is common.—*L. icarus.* Abundant every year; particularly so in July and August, 1892. As I have not paid special attention to this species, I cannot say anything in reference to the variation it may exhibit in this district.—*L. corydon.* Fairly common every year on the chalk downs. Although I have seen or taken the male every season since 1886, I have never met with a female specimen.—*L. argiolus.* Not common. It occurs in several places among holly, but only in very limited numbers. Met with for the first time on April 21st, 1892; out much earlier in 1893, but I did not make a note of the exact date; in 1894, first specimen seen April 8th. I have never seen any specimens of a second brood.—*L. minima.* Rare. This little species I have only met with on one occasion (in 1885). A very few specimens were seen in an old chalk pit near the town; the locality has been searched several times since, but without any others being discovered. Most likely it is to be found in other very limited areas in the district.

Syrichthus malvæ. Common, but local in woods. Has any one previously noticed the great resemblance between this species and

Euclidia mi? I was particularly struck with it on May 24th, 1894, when both species were on the wing together. I saw and captured what I at first took to be a rather large specimen of *malvæ*, but a nearer examination proved it to be *mi* (a female). The males being smaller, their resemblance to *malvæ* is even greater. I may add that the specimens of *mi* were all rather worn; it is quite possible that if freshly emerged the yellower markings would be enough to distinguish it when on the wing from *malvæ*.

Nisoniades tages. Rather local, but commoner than the last species. It is found at the same time and in the same localities as *malvæ*. A single specimen of a second brood, which I captured on August 6th, 1893, is rather darker, and has the markings rather less distinct than usual.

Hesperia thaumas. Fairly common in some years, but it is very local in this district. Common in 1892; rare in 1893; and not seen in 1894. — *H. sylvanus.* Common; in some years it is abundant everywhere. Rare in 1894. I have several times found the larvæ of this species, but only succeeded in rearing the imago on one occasion, June 19th, 1886. — *H. comma.* Rather rare, and very local in this district. I captured a few specimens in August, 1885, but saw no others until August, 1891, when I saw a number in the possession of an entomologist, who was at that time living near Guildford. He informed me that they were taken at the same spot as I captured it six years before. In August, 1892, the locality was visited, but only one specimen was seen; I think the species was not out so early as usual on that occasion. I regret that I have been unable to visit the locality at the right season since.

The foregoing list of thirty-three species contains only those noticed by myself during the past ten years. Although I have heard of one or two others being taken, such as *Colias hyale* and *Melanargia galatea*, I have not included them in the list.

Guildford, February, 1895.

AFRICAN RHOPALOCERA.

By Philip de la Garde, R.N., F.E.S.

The following is a list of Rhopalocera collected by me on the Cape of Good Hope Station during the last two years.

For the identification of the majority of the species I am indebted to Mr. Trimen, Curator of the South African Museum at Cape Town.

Danais (Latr.) *chrysippus*, Linn.; St. Helena. *D. dorippus*, Klug; Mombasa. *D. alcippus*, Cram.; Sierra Leone; Bathurst. *D. limniace*, Cram.; Mombasa.

Amauris (Hübn.) *dominicanus*, Trim.; Mombasa.

Ypthima (Westw.) *asterope*, Klug; Mombasa; Zanzibar.

Pseudonympha (Walleng.) *hyperbius*, Linn., *P. vigilans*, Trim., *P. sabacus*, Trim., *P. trimenii*, Butl., and *P. cassius*, Butl.; Simon's Town.

Leptoneura (Walleng.) *clytus*, Linn., and *L. cassus*, Linn.; Simon's Town. *L. cassina*, Butl.; Saldanha Bay.

Mycalesis (Doubl.) *safitza*, Hewits.; Mombasa; Zanzibar. *M. perspicua*, Trim.; Zanzibar.

Melanitis (Fab.) *leda*, Linn.; Mombasa.

Acræa (Fab.) *horta*, Linn.; Simon's Town. *A. neobule*, Doubl.; Mombasa. *A. natalica*, Boisd.; Zanzibar. *A. cecilia*, Fab.; Bathurst; Sierra Leone. *A. encedon*, Linn.; Zanzibar. *A. buxtoni*, Butl.; Mombasa; Zanzibar. *A. serena*, Fab.; Bathurst. *A. bonasia*, Fab.; Sierra Leone. Three species from Sierra Leone, and two from Zanzibar, at present undetermined.

Atella (Doubl.) *phalantha*, Drury; Mombasa.

Pyrameis (Doubl.) *cardui*, Linn.; Simon's Town; St. Helena; Ascension; Tristan da Cunha (?).

Junonia (Doubl.) *cebrene*, Trim.; Mombasa; Bathurst. *J. clelia*, Cram.; Mombasa; Zanzibar; Bathurst; Sierra Leone.

Precis (Doubl.) *natalica*, Felder; Mombasa.

Eurytela (Boisd.) *dryope*, Cram.; Sierra Leone. One species from Zanzibar, unidentified.

Hypanis (Boisd.) *ilythia*, Drury; Mombasa; Zanzibar.

Neptis (Fab.) *agatha*, Cram.; Sierra Leone.

Diadema (Boisd.) *misippus*, Linn.; Mombasa; Ascension.

Aterica (?). One species from Zanzibar.

Humanumida (Hübn.) *dædalus*, Fab.; Bathurst.

Lycæna (Fab.) *osiris*, Hopff.; Zanzibar. *L. barkeri*, Trim.; Mombasa. *L. asopus*, Hopff.; Zanzibar. *L. asteris*, Godt., *L. ortygia*, Trim., *L. methymna*, Trim., and *L. messapus*, Godt.; Simon's Town. *L. lysimon*, Hübn., and *L. lucida*, Trim.; Zanzibar. *L. bætica*, Linn.; Zanzibar; Cape Peninsula; St. Helena; Ascension; Bathurst. *L. sichela*, Walleng.; Zanzibar; Bathurst. *L. lingeus*, Cram., and *L. palemon*, Cram.; Simon's Town. *L. telicanus*, Lang; Zanzibar; Mombasa. *L. moriqua*, Walleng.; Mombasa. *L. thespis*, Linn.; Simon's Town. Three species from Bathurst, unidentified.

Lachnocnema (Trim.) *bibulus*, Fab.; Zanzibar.

Lycænesthes (Moore) *sylvanus*, Drury; Mombasa.

Deudorix (Hewits.) *antalus*, Hopff.; Sierra Leone; Bathurst. *D. licinia* (female ?), Mabille; Mombasa. One species from Sierra Leone.

Hypolycæna (Felder) *philippus*, Fab.; Mombasa. *H. lara*, Linn.; Simon's Town.

Iolaus (Westw.) *bowkeri*, Trim.; Mombasa.

Zeritis (Boisd.) *zeuxo*, Linn.; Saldanha Bay. *Z. chrysaor*, Trim., *Z. pyroeis*, Trim., and *Z. thysbe*, Linn.; Simon's Town. *Z. osbecki*, Auriv.; Saldanha Bay. *Z. thyra*, Linn., and *Z. pierus*, Cram.; Simon's Town.

Arrugia (Walleng.) *protumnus*, Linn.; Simon's Town.

One specimen from Bathurst unidentified, but apparently allied to *Eurytela*.

Terias (Swains.) *brigitta*, Cram.; Bathurst. *T. zoe*, Hopff.; Mombasa; Zanzibar; Bathurst. *T. floricola*, Boisd.; Sierra Leone. One species from Sierra Leone, unidentified.

Mylothris (Butl.) *agathina*, Cram.; Zanzibar; Durban. One species (*? chloris*) from Bathurst, unidentified.

Pieris (Schrank.) *mesentina*, Cram.; Bathurst; Mombasa. *P. severina*, Cram., and *P. boguensis*, Feld.; Mombasa. *P. creona*, Cram.; Bathurst. *P. hellica*, Linn.; Saldanha Bay; Port Elizabeth. *P. glauconome*, Klug; Bathurst.

Herpænia (Butl.) *eriphia*, Godt., var. *lacteipennis*, Butl.; Bathurst.

Teracolus (Swains.) *ione*, Godt., *T. annæ*, Walleng., *T. auxo*, Lucas, and *auxo* var. (?); Mombasa. *T. evippe*, Linn.; Sierra Leone. *T. omphale*, Godt., and *T. vesta*, Reiche; Mombasa. One species from Mombasa, and one from Zanzibar, unidentified.

Colias (Fab.) *electra*, Linn.; Cape Peninsula.

Eronia (Boisd.) *cleodora*, Hübn.; Mombasa.

Callidryas (Boisd.) *florella*, Fab.; Mombasa.

Papilio (Linn.) *demoleus*, Linn.; Simon's Town.

Cyclopides (Westw.) *malgacha*, Boisd.; Simon's Town. *C. mineni*, Trim.; Mombasa.

Pyrgus (Westw.) *vindex*, Cram.; Simon's Town. *P. diomus*, Hopff.; Zanzibar. One species from Mombasa, unidentified.

Pamphila (Fab.) *hottentota*, Latr.; Simon's Town. *P. lugens*, Hopff., and *P. fatuellus*, Hopff.; Mombasa. One species from Simon's Town, and one from Zanzibar, unidentified.

Hesperia (Fab.) *forestan*, Cram., and *H. anchises*, Gerst.; Mombasa.

If any one should wish for any information as regards locality or date of capture of any species named, I shall be very pleased to give such in as great detail as I may be able.

H.M.S. 'Raleigh,' Simon's Town, Oct. 29th, 1894.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 82.)

Phothedes captiuncula, *Tr.*, var. *tincta*.—Neither the type nor its darker variety *expolita* seems to occur in Ireland. Mr. Birchall found a richly-coloured form in Co. Galway, which he did not describe, but which is so distinct that it is worthy of a varietal name. It approaches *Miana literosa* in colour, though in size and design easily distinguishable. Fore wings: basal third of a warm grey, somewhat mottled, followed by a deep rose-coloured band reaching from costa to inner margin, bordered interiorly by a very sinuous festooned line of purple-brown, edged externally with grey, and exteriorly by one of similar colours, deeply elbowed toward the outer margin of the wing; the outer third of the wing is of a shining pink, with a darker ruddy patch along the costa, but not reaching to the apex, and a clear whitish suffusion along the lower and outer portion of the red central band, corresponding to the whitish patch shown in the same position in *Miana strigilis* and *fasciuncula*. Hind wings of a sooty brown, shot with a ruddy reflection. All fringes of a dirty grey. Thorax of a dingy brown; abdomen paler. Extremely local, but there plentiful. In a field near Galway, and in a portion of Castle Taylor demesne near the village of Ardrahan, numerous. No doubt it will be found elsewhere in Galway and perhaps Clare, whose bare limestone tracts thinly covered with herbage correspond with its favourite haunts in the neighbouring county.

Celæna haworthii, *Curt.*—This moth occurs in most Irish counties, as might be expected from the large tracts of bog and moorland in Ireland abounding with various species of bog-cotton grass, in the roots of which the larva feeds; but, nevertheless, Mr. Campbell informs me, falls a victim to some species of ichneumon. Nevertheless, though locally very abundant, it is not so frequently met with as might be expected, as, except when flying by day, it is inconspicuous, and difficult to take at dusk. It is, however, attracted by the flower of ragweed, but is then usually worn. Various forms are met with, the handsomest of which is very clearly marked on a reddish brown ground. This occurs at Killarney; Crossmolina, Mayo; Markree, Co. Sligo; shores of L. Swilly, Co. Donegal; and Ballycastle, Co. Antrim (*Tutt*). Examples with both stigmata and the white nervures conspicuous are frequent; but I think a large proportion of Irish specimens show a tendency towards obsolescence of design, notably in regard to the transverse strigæ. Localities:—"Common on the Dublin and Wicklow Mt." (*B.*); above Powerscourt Waterfall and L. Bray; Killynon and elsewhere in Co. Westmeath; Mohill, Co. Leitrim; Toberdaly and about Shannon Harbour, King's Co.; Markree, Rockwood, Croagh Mt. near Dromore West, very abundant, and Lissadell, Co. Sligo; Inishowen (*W. E. H.*), and near Derry (*C.*); Ballycastle, Co. Antrim (*Bw.*); near Belfast, abundant (*W.*); and Enniskillen; Crossmolina, Co. Mayo, abundant; Galway (*A.*); Killarney, &c.

Var. *lancea*, St.—"One from Ballycastle" (*Tutt*, Brit. Noct.).

Var. *tripuncta*, Curt.—Occurs at Markree, Co. Sligo; and Buncrana, Co. Donegal.

Var. *hibernica*, St.—Three Rock Mt., Co. Dublin (*Bw.*); Ox Hill range near Dromore West, Sligo; Crossmolina, Mayo; and Killarney.

Grammesia trigrammica, *Hufn.*—Widely distributed but decidedly local, being absent from many localities, but sometimes numerous. The pale yellowish grey form is frequent at Drumreaske, Monaghan, and elsewhere; and occasionally there, and in Galway, &c., the ochreous. The var. *obscura*, Tutt (*bilinea*, Haw.), is pretty common at Howth; at Shannon Harbour, King's

o. ; and near Kenmare, Co. Kerry, where it occasionally ecomes so dark that all the transverse lines are obliterated, so hat the fore wings are of a unicolorous brown. The following re a few localities :—Belfast district, not common; Armagh (*J.*); Castle Bellingham, Co. Louth (*Thornhill*); Farnham, Cavan, scarce; Enniskillen (*Col. Partridge*), scarce; Favour Royal, Co. Tyrone, scarce; Cromlyn (*Mrs. B.*); Westmeath; Markree Castle, Co. Sligo, not rare; and var. *obscura*, Phœnix Park (*C. G. B.*) and lsewhere in Co. Dublin, and Wicklow.

Stilbia anomala, *Haw.*—Chiefly found on the sea-coast, but occasionally inland. Local and sometimes plentiful. Probably very generally distributed on the Irish seaboard. Attracted to ight, sugar, and flowers of ragweed. Also sometimes flies in he sunshine. On one occasion, about midday, at Ards House, Co. Donegal, I noticed a sudden flight of these moths, and knocked down one of them with my hat as it rose from the grass beside me. The flight lasted but a very short time. There is but little range of variation shown. Some are of a more dingy coloration than the ordinary type, as at Black Mt., near Belfast, and elsewhere; but very fresh specimens are often of a pale bluish grey on the lower half of the fore wing, with the design very sharply and well drawn in black. There is great diversity in size among the males, some being only a fraction less than 1½ in. in expanse. The females are rarely taken on the wing, and seem always much scarcer than the other sex. Localities:—Cave Hill (*C. G. B.*), and Black Mt., Belfast, abundant; and one at Newcastle, Co. Down (*W.*); Giant's Causeway, abundant (*C.*); Magilligan, Co. Derry; Buncrana, Fanad, and Ards, Co. Donegal; Knocknarea, very abundant (*Russ*), and Lissadell, Co. Sligo; Glandore, Co. Cork (*D.*); Greystones, Co. Wicklow; Howth, at Sutton and the Bailey, abundant. Inland it has been met with at Cappagh, Co. Waterford (*U.*); Ardrahan (*Miss N.*) and Clonbrock one (*R.E.D.*), Co. Galway.

Caradrina morpheus, *Hufn.*—A rare species seldom met with in Ireland and in scanty numbers. The headquarters seem to be Galway, and all the specimens I have seen are similar to the English form, greyish fuscous. Localities:—Powerscourt, Co. Wicklow (B. Supp. Cat.); Dinish and Furinish Islands, Kilkerran Bay (*Lieut. Walker, R.N.*), Ardrahan two (*Miss N.*), Co. Galway; Shannon Harbour, on the verge of that county, and near Kenmare, Co. Kerry; one at Magilligan, Co. Derry (*C.*); one at Castle Bellingham, Co. Louth (*W. B. Thornhill*).

Caradrina alsines, *Brahm.*—Not common. Howth, Co. Dublin; near Sligo, rare (*Russ*); Derry, rare (*C.*), and Magilligan (*R. Curzon*); Clogher Head, Co. Louth, not rare; Tempo, Co. Fermanagh, abundant (*C. Langham*); one at Ardrahan, Co.

Galway (*Harker*); two at Cappagh, and abundant at Minehead, Co. Waterford.

Caradrina taraxaci, *Hb.*—Very generally distributed, but not apparently in great numbers as far as my experience serves. A very dark blackish form occurs occasionally, which near Kenmare, Sneem, Waterville, and other parts of the Kerry coast, and at Dalyston, Co. Galway, appears to become a local variety. I have also met with it at Renvyle, on the Connemara coast; and in Tyrone.

The var. *sordida*, Haw., is occasionally met with.

(To be continued.)

NOTES AND OBSERVATIONS.

The late Mr. Machin's Sale.—My friend Mr. T. W. Hall must surely have been napping when he penned his notes on this sale for the last number of the 'Entomologist.' He says, p. 130:—"Lot 7, which fetched 32/6, as per catalogue, included a pale form of *Euchloë cardamines*, and also a curious variety. The first was a faded male, very old, the colour due only to fading, as the base of the wings exhibited a smoky brown instead of the usual clear grey of fresh specimens; the curious variety was a very poor specimen, and apparently the orange had been removed from the right side, as a few orange scales remained." As a matter of fact these descriptions, except so far as the condition of the specimens is concerned, are absolutely incorrect. The first specimen, a male, is one of those pale-tipped specimens to be found in most collections, but differs from the general run of them in having the nervures within the yellow tip of the usual orange. The difference in the colour of the tips is striking, and could not possibly be caused by fading, any more than an Oxford tie could become a Cambridge one by exposure in a shop-window. From the catalogue, moreover, we know that it was taken by Mr. Machin himself at Ilford, and his own notes describe it as "one pale *cardamines* taken by myself in Cauliflower Lane, Ilford," which proves, if proof were necessary, that it was pale when captured. But it is with regard to the second specimen that Mr. Hall's criticism is so inexplicable. He failed to see that the specimen is set under-side up, so that what he calls the right side is really the left; and has also forgotten that in *cardamines* the black tip to the wing varies in size and shape according to the sex, so that even if the orange had "been removed," the black tip left would have been that of the male, not, as in this case, that of the female. The specimen is really one of those very curious gynandromorphic ones occasionally met with, of which there are scarcely two alike. I append a short description of the specimen as it really is:—Upper side: typical female except for a slight dash of orange on the costal nervure near the tip of the right fore wing; the discoidal spots of equal size. Under side: right fore wing (left as Mr. Hall would describe it) normal male; left fore wing (right *teste* Mr. Hall) normal female, except for slight orange markings on some of the nervures in the region of the tip, and one orange spot below the discoidal spot, which is larger than that of the other wing; secondaries normal female. Mr. Machin's own note of this specimen is, "Unique specimen of *cardamines*, taken by Mr. Bellamy and acquired by purchase." I would ask your insertion of this correction, partly because, in order to save confusion hereafter, I, as purchaser, object to having my specimens so wrongly described; but more particularly because our old friend William Machin should not rest under the imputation of not knowing a variety when he saw one, or of having faked a variety by "removing the orange colour," although I fancy Mr. Hall would find this process easier said than done. Will he try? As regards the remainder of Mr. Hall's note, I will only add that I should much like to see a specimen of *P. phlœas* with "the blue spots forming a conspicuous blue bar," but have little expectation of ever doing so.—C. A. Briggs; 55, Lincoln's Inn Fields, April 11th, 1895.

Plusia chrysitis.—I took a longish series of *P. chrysitis* in 1893, and found that a good many, say a fourth, of the specimens were green-bronze and the rest golden bronze. If I remember right, I pointed this out to Mr. Kane, and I think he said it was worth noting and looking into. So last year I took more, but all were freshly emerged, and I also bred three or four from larvæ. All these examples were of the golden bronze type. Later on, in 1894, I took a few more specimens when they were *passé*, and the majority were green-bronze. I have therefore come to the conclusion that the green-bronze is, so to speak, a fading of the golden bronze. I shall be glad to know if you or your readers can bear me out in this. The two coloured bronzes are quite distinct. — W. D. Thornhill; Castle Cosey, Castle Bellingham, Ireland, March 29th, 1895.

Those "Jumping Eggs."—By permission of Mr. Trimen, I transcribe from his letters to me his remarks on these so-called "eggs," which will, I am sure, be of interest to the readers of the 'Entomologist.' In reference to what has already appeared in the 'Entomologist' for March and in previous numbers, Mr. Trimen says:—"It is clear that Mr. Bignell is disposed to think that the larva of our 'eggs' from the taai bosch (a *Rhus*) will turn out to be some *parasite* on the maker of the gall-like swellings on the leaves and terminal shoots. I do not think that our Cape larva is a parasite, but the original and proper occupant of the swelling, and the maker of the little egg-like 'cocoon,' because, although I have opened a considerable number of the galls and examined the occupants, I have never found anything but the same species of larva (of different sizes), and no remains whatever of a previous inhabitant that had been devoured or sucked to death. (Where parasitic larvæ have eaten the rightful inhabitant, one always finds the skin or harder parts of the victim lying round the intruder.) I do not feel certain yet whether our insect is hymenopterous or coleopterous, but incline to think it the latter, as does also Mr. Péringuey; and I note that you say Mr. Waterhouse also regards it as probably that of a weevil. Mr. Bignell's very interesting case of the jumping cocoon of the ichneumon is altogether distinct from ours, for he shows that the larva, when full-fed in the *Noctua* caterpillar on which it preys, leaves the victim, hangs by a silken thread, and spins its cocoon at the end of the thread; soon afterwards the thread breaks, the cocoon falls to the ground, and then begins the jumping of the cocoon from the jerks of the larva within. Our fellow is absolutely jammed between the upper and lower membranes of the leaf, and certainly does not escape from the withering or fall of the latter, as far as can be judged from branches of the taai bosch kept indoors. These larvæ are evidently of very slow growth, and this is how they have so puzzled us; for you may keep them *au naturel*, or only in the extracted 'cocoon' or 'shell' (of course this is only termed an 'egg' in common parlance from its appearance), for weeks and months, and they will not '*turn*' into the perfect insect. I know I got quite annoyed with the persistent ticking, day after day, of the free 'eggs,' as they untiringly jumped and jumped in their boxes. I cannot see how the little fellows can get a chance of jumping under natural conditions; what is to set free the shell which holds one from the closely-investing leaf-membranes? Of course, *when the perfect insect is developed*, it must have the means of effecting its egress through both cocoon and leaf; but such cases abound throughout the insect world. The difficulty in our fellow is why such fine saltatory powers should be possessed by a grub which to all appearance would in nature never have a chance of exercising them; and the question arises whether, after all, the jumping is anything more than an accident due to the vigorous twists of the larva resenting the removal from its natural investing leaf. Possibly, indeed, the larva may habitually indulge in the same muscular exercise during its normal condition of complete imprisonment in both 'cocoon' and investing leaf. Until somebody has the time and patience to sit down steadily to the task of tracing out the whole history of the taai bosch grub from first to last, we can only guess at what is probable." In conclusion, Mr. Trimen affirms that "at present there is so very little known or proved about it that until some definite facts as to its life-history come to hand it is impossible to speak with certainty."—Catherine C. Hopley; 42, Haggard Road, Twickenham.

"*Re* A Hunt for Phorodesma smaragdaria."—Acting on Mr. Elisha's advice (*ante*, p. 130), I have looked up his "correct accounts" of *Phorodesma smaragdaria*, and I hope I have read them with more care than he seems to have bestowed on my narrative of a hunt for the same species. In the 'Transactions' of the Entomological Society of London (1886, p. 467), Mr. Elisha refers to his previous record (Entom. xvii. 235) by saying, "As stated in that note, I did not then know what the larva fed on." We turn to Entom. xvii. 235, and read, "It is now three years since I first went after this larva, and many long and fruitless journeys I have had since that time, extending over miles of ground in every direction on the salterns. Year after year I was searching the wrong plants"; and further on in the same note he remarks, "Now I know its food-plant I am in hope of filling my series, although I am inclined to think that will be no easy matter, for I had quite two hours' collecting after I had taken this larva, but failed to take another. *The exact locality and the food-plant I must for obvious reasons at present decline to state*," &c. My paper was intended to give both locality and food-plant, so that any entomologist wishing to obtain *P. smaragdaria* might do so without experiencing all the inconvenience which Mr. Elisha seems to have suffered. It was also my wish to add further facts in the natural history of the species. Fobbing Marsh, near Pitsea, is where our late respected fellow-worker, Mr. Machin, was followed by a number of collectors who thought it worth their while to obtain the knowledge of the food-plant of *P. smaragdaria* by such means. I regret that the mention of the name of the discoverer of the larva in this country should have caused "keen annoyance." In my anecdote I made no allusion to any one by name, but merely gave it as "a story" handed down by tradition; and how my words could have been construed into an attack on the late Mr. Machin I am quite at a loss to understand.—Henry A. Auld; 31, Belmont Hill, Lee, S.E., April 8th, 1895.

[Although Mr. Elisha did not mention the name of the food-plant of the larva in his note on *P. smaragdaria* in 1884 (Entom xvii. 235), he did so in his account of the life-history of the species ('Transactions' of the Entomological Society, 1886, p. 467).—Ed.]

Note on Vanessa io.—Hybernated imagines of *Vanessa io* were quite in evidence, flitting about the grassy slope to the beach at Claremont Park, Blackpool, Lancashire, on April 13th and 14th. I was pointing one out with my stick to a friend as it was sunning itself, with lazily moving half-opened wings, and not seeming to see or care, till the shadow of my stick passed over it, when it immediately flew and alighted on the grass a little farther on, where I repeated the experiment with exactly the same result.—John Watson; 94, George Street, Alexandra Park, Manchester.

CAPTURES AND FIELD REPORTS.

Collecting in Wales, 1894.—I spent the first three weeks of last July at Barmouth, and although the weather was not particularly favourable, still I managed to get about seventy different species of Lepidoptera. The first few days *Argynnis selene* and *Lycæna ægon* were very common, but in bad condition. *A. adippe* was scarce; I only saw a very few. *A. paphia* was not out; but *A. aglaia*, after the 10th of the month, was simply swarming everywhere; it was no uncommon thing to see as many as twenty flying at a time. *Macroglossa stellatarum* was common hovering over the red valerian. *Nola mundana* was settling about on different walls, or flying gently at dusk. *Lithosia lurideola*, a few at dusk. *Bombyx rubi* larvæ were about half grown, feeding on heath on most of the mountain sides; whilst the larvæ of *Eupithecia pulchellata*, in all stages of growth, could be taken from every foxglove, and, as usual, more than three-fourths of them were ichneumoned. *E. venosata* larvæ were nearly as common in the *Silene*, and nearly as badly ichneumoned. With these latter were also larvæ of *Dianthœcia capsincola* and *D. carpophaga*. The imagines of *E. constrictata* were found commonly at rest on the stone walls, and also easily disturbed from their food-plant, the wild thyme, which grows so abundantly on all the mountain sides. I got a fine series of this insect and also about 250 eggs. The larvæ hatched out by the end of July, and although placed upon living plants I only got three into pupæ; most of them were nearly full grown, and then they died off rapidly. Mr. Carrington

(Entom. xviii. 142) mentions that they are not easy to rear. *Acidalia marginepunctata*, *A. subsericeata*, *Emmelesia minorata*, *E. decolorata*, *E. affinitata*, *E. alchemillata*, *Venusia cambrica*, and *Abraxas ulmata* all turned up in tolerable numbers. *Tanagra atrata* was out in splendid condition on July 3rd, but very worn on the 9th. The best insect that I took was *A. contiguaria;* I caught six one evening on the wing without moving, and although I tried the same place on several evenings afterwards, I did not get any more there, but found another at rest about two miles away. No doubt, had I known the right way to work for this species, I should have got plenty of it; perhaps some readers of this note can give me a hint or two, as I shall most likely go to the same spot again this summer. *Melanippe galiata*, *Eubolia palumbaria*, and *Pseudoterpna pruinata* were all common; so also were *Pyrausta ostrinalis* and *Herbula cespitalis;* a few *Ennychia cingulata* were taken, also *Scoparia cembræ* and *S. mercurella*. The only "plume" was *Aciptilia tetradactyla*, whilst the Crambites were represented by *Crambus falsellus*, *C. pascuellus*, *C. culmellus*, *C. inquinatellus*, *Pempelia palumbella*, *Rhodophæa consociella*, *C. perlellus* with its variety *warringtonellus* and other forms: the last-named species was exceedingly variable. As I did not try sugar I obtained nothing of any note among the Noctuæ. From the foregoing notes it will be seen that although no rare species was taken, a fair variety of insects was obtained, and in my opinion there are many worse places to spend an entomological holiday at than Barmouth. I hope at a future time to send a report of my visit there this summer.—J. N. Kenward; Rosslyn, New Eltham, Kent.

Notes from Reading.—On Jan. 19th *Hybernia rupicapraria;* on the 20th, *Phigalia pedaria* (*pilosaria*) and *Hybernia leucophæaria* were out here; I did not see any more until Feb. 24th, when I took five *H. leucophæaria* and three *Anisopteryx æscularia*, just emerged, hanging up on an old fence drying their wings. On March 17th two *Hybernia marginaria* (*progemmaria*); also one male *Nyssia hispidaria*, the first I have ever taken in this district, but I had one female come out in my breeding-cage last spring from pupa dug here.—W. E. Butler; Hayling House, Reading.

Rare Lepidoptera in Surrey.—Though rather late, I wish to record the capture of *Deiopeia pulchella* and *Argynnis latona* at Brighton in 1892. —H. U. Edelsten; The Elms, Forty Hill, Enfield.

Notes on the Early Moths.—On March 16th I went to Delamere Forest to try and get a female *Nyssia hispidaria*. Very few signs indeed of spring were visible as the train sped on its way by field and pond. Pastures were brown and bare; tiny catkins were only beginning to show on the willows, and the Forest appeared as sad and desolate as winter could make it. I had scarcely been half an hour in the wood before I found the object of my search—a female *N. hispidaria*, the nearly black form—but it was the only representative of the species I came across. *Anisopteryx æscularia* was fairly common, perhaps two dozen altogether. Neither was *Hybernia leucophæaria* more plentiful, but I had the luck to take a specimen almost black. *Phigalia pedaria* (*pilosaria*) reached three specimens only; one example is marked across the upper wings with bold dark bars. A crippled *Larentia multistrigaria* completed my list of captures, all of which were taken at rest off oak trunks excepting the *L. multistrigaria*, which I picked from a railing. On March 23rd I went again to Delamere Forest. The fields were green after a fine week of spring weather. Coltsfoot began to show its yellow flowers, and the snowdrops (very late this year) were joined in the gardens by crocuses in full blossom. Shortly after entering the Forest I took a fine female *Asphalia flavicornis* at rest on an oak; but it soon became evident I was too late for the early moths, except the sombre little *Tortricodes hyemana*. *A. æscularia* I did not see at all, and only a few specimens of *H. leucophæaria* were observed. Collectors who want *A. flavicornis* should search low and rather isolated birches in June and July. They will find the caterpillar commonly enough, each inside a folded leaf. Yet the moth is seldom found in spring! My best insect was a female *H. leucophæaria*, from which I shall try to breed, as the males are of all shades and patterns at Delamere, ranging from entirely black, or black-brown, to the type. The female is wingless, white, well spotted with black, and about the size of the female *H. marginaria* (*progemmaria*). The largest spots are arranged in two dorsal rows. The females vary much, but the description I give seems to usually hold good. Of *N. hispidaria* I took only one specimen, a dark male. In some seasons this is a difficult insect to time, and the present one is an example. Two female *H. marginaria* complete my list; they differ very much in size, although full of eggs, one being about twice the size of the other, and with remarkably large wings for a female. The basal half of each wing is almost blackened by two dark curved and transverse shades. What a puzzle that the larvæ of wingless species, even in the earliest stages, should be so widely distributed among the trees, and even at the ends of the branches! The females are sluggish, and incapable of such a distribution. The solution appears to be that the males absolutely carry up the females! (Entom. xxvi. 20). Throughout the day a breeze blew from the south-west, bringing rain at two p.m. All my specimens, except one of three *P. pedaria* which I forgot to mention, were taken from the sides of oaks away from the wind, that is, from the sides facing north and east.—J. Arkle; Chester.

Notes from Aysgarth, Poole.—The Tæniocampas have turned up pretty well at the sallow blossoms in this locality; *T. munda*, *T. cruda*, *T. instabilis*, and *T. gothica* are fairly plentiful. On Sunday, April 7th, they swarmed; I saw hundreds, but did not take any. On April 11th I took *Selenia lunaria* in the park here, and also *Eupithecia subumbrata*.—W. Parkinson Curtis; Aysgarth, Poole, April 14th, 1895.

Nyssia lapponaria in Scotland.—Mr. W. M. Christy informs me that he has lately bred some specimens of *N. lapponaria* from larvæ taken by himself in Scotland last year. I am pleased to add that he has obtained some ova, and that he has kindly promised that if he is successful in getting the species through all its stages he will give us an account of its life-history. The only British example of *N. lapponaria* that we know anything about is the one taken by Mr. Meek's collector at Rannoch in the spring of 1871. From Mr. Meek this unique specimen went into the collection of the late Mr. Roper Curzon (Entom. v. 311), and subsequently found its way into the possession of the late Mr. Philip Harper. On the death of the last-named gentleman it was sold at Stevens's for, I believe, £14, and ultimately passed into the collection of Mr. Clarence Fry, where, if my information is correct, it still remains. *N. lapponaria* is stated to be found on the Continent only in Lapland and the Upper Engadine. Staudinger considers this insect may probably be an alpine and boreal form of *N. pomonaria*, which occurs in Germany, Switzerland, North-west France, Livonia, Finland, and Lapland; and I also incline to this view.—Richard South; Oxford Road, Macclesfield.

NOTES FROM FOREIGN PERIODICALS.

Hermaphrodites of Saturnia carpini.—In the spring of 1889, a resident in Bonn found, in the neighbourhood of that city, a large female of *Saturnia carpini*, which subsequently deposited a great number of eggs. Over one hundred imagines emerged the following spring, only distinguishable from captured specimens by their slightly smaller size. A few pupæ remained over until the next spring, when imagines appeared from them about the usual date. Among these latter were no less than six hermaphrodites, of which three are now in the author's collection, and he has seen the fourth; while enquiries established beyond doubt the hermaphrodite character of the remaining two. The author describes three of the six varieties as follows:—The fourth specimen alluded to above is a perfect hermaphrodite, the body being exactly divided from the head to the tail into two halves, showing respectively male and female characters, which include even the genitalia. The wings are very curiously divided in a diagonal manner thus:—The right fore wing and the left hind wing have male coloration, and the left fore wing and the right hind wing are coloured as in the female. The male and female wings, as well as being different in colour, have the usual sexual disparity in size, giving the specimen, which is well developed and as big as a middle-sized female, a very curious and beautiful appearance. The second specimen is a faultless female, of middle size, having both antennæ pectinated as in the male; the costal border of the right fore and hind wings are decidedly male, with orange coloration. The third is a very interesting form; on the upper surface of all four wings the coloration is male, but the right wings are considerably larger than is usual in the male. The right wings are greyish below as in the female, while the left wings have male colours on the under surface. The abdomen and thorax are of the male form, though the former is swollen with eggs, which can clearly be seen through the spaces between the segments. The genitalia are completely divided into male and female, the male ancillaries being very strong and larger than usual. Unfortunately the left wings of this specimen are not fully developed; still, if one regards them as full-grown they would scarcely cover three-quarters of the area of the right (female, under side).—(Carl Frings in *Societas Entomologica*, No. 23, p. 182.) W. M.

OBITUARY.

Mr. J. Mortimer Adye, we regret to learn, died at Bournemouth on March 30th, 1895. The deceased, who was only 35 years of age, was well known as a collector of Lepidoptera, especially of the species occurring in the New Forest district. He was elected a member of the South London Entomological and Natural History Society in 1886, and a Fellow of the Entomological Society of London in 1891.

Societies.—Want of space obliges us to defer the publication of the Reports of Societies until June.

THE ENTOMOLOGIST

Vol. XXVIII.] JUNE, 1895. [No. 385.

NOTES ON VARIOUS SPECIES INCLUDED IN VOL. II. OF MR. BARRETT'S 'LEPIDOPTERA OF THE BRITISH ISLANDS.'

By W. F. Kirby, F.L.S., F.E.S., &c.

Sphinx pinastri.—It is curious to notice how completely a conspicuous species may be lost sight of for many years and placed in our supplementary lists as "introduced without authority," and subsequently reinstated on its being discovered that it had actually been "omitted from the British list without authority" instead. It is true that the older authors introduced North American and other foreign insects into their lists, some of which at least had apparently been accidentally imported into England in a living state; but in the early years of the present century there was but little communication between England and the continent of Europe, and many, perhaps most, of the European species *likely to occur in England* and stated to be British by the older authors, and subsequently doubted, have now been reinstated in our lists.

Deilephila livornica.—Mr. Barrett has fallen into a curious error respecting *D. lineata*, which he first notices as a variety of *D. livornica*, and then, in the next paragraph, as a distinct species, under the name of *D. daucus*.

Sesiidæ.—With further information respecting their habits, these Clearwings have been more freely taken or reared in England, though one or two, including the large and conspicuous *Sesia asiliformis*, still remain excessively rare. We believe that the alleged occurrence of *S. scoliæformis* in Ireland is now fully confirmed.

Zygænidæ.—Mr. Barrett's observations on the burnet moths (*Zygæna*) will be read with much interest. He remarks that no locality for *Z. minos* is known in England; but we may mention that some years ago specimens of a *Zygæna* captured at Tintagel in Cornwall were announced as *minos*, and subsequently submitted to the late Mr. Birchall, who decided that they were not *minos*; but he was unable to say what they were. Cornwall would, however, be a very probable locality for the insect to be found; but we are not aware that the matter has yet been investigated.

Among the species casually taken in England is *Syntomis phegea*. It is a Mediterranean species, extremely local in Central Europe north of the Alps, though it may be extending its range in that direction. Being a gregarious day-flying species, found settling on tall flowers, or flying about bushes, the specimens taken singly in England can only have been casual importations.

CALLIMORPHA HERA.—This species is probably a recent introduction to the country. It is a day-flying moth, long known as an inhabitant of the Channel Islands, and latterly found in some quantity in Devonshire. Entomologists, unlike botanists, do not recognise the Channel Islands as part of the British Islands, and hence this species had to wait its turn to take its place in our British lists.

DEIOPEIA PULCHELLA.—The comparatively large number of specimens of this species which have been taken in England of late years, as compared with its former excessive rarity as a British species, illustrates the present tendency of the Mediterranean fauna to extend its limits northwards along the coasts of Western Europe. *D. pulchella* is an almost ubiquitous species in the warmer parts of the Old World.

ON THE REARRANGEMENT OF THE FABRICIAN GENUS *COLIAS*, AND THE PROPOSAL OF A NEW GENUS OF PIERINÆ.

By JOHN WATSON.

THE secondary sexual characters of Rhopalocera have always been of the utmost importance in classification, possessing as they do such constant lines of demarcation of genera, and being as constant as any system of classification based upon neuration alone; and though I do not wish it to be thought I desire to extol an arrangement based upon these characters alone, above one on neuration, yet at the same time the consistency of such an arrangement is undoubted, and more particularly where it applies to such a heteromorphic collection of species as are at present included in the Fabrician genus *Colias*.

This fact has never been brought home to me more forcibly than when checking my arrangement of this genus with that of Mr. Kirby's 'Catalogue of Diurnal Lepidoptera'; and a careful examination of my own and other collections of palæarctic Rhopalocera brings me to the conclusion that the assemblage of species hitherto classed as *Colias* resolve themselves into two natural genera, and for this purpose I propose the founding of a new genus. According to Mr. Kirby (*l.c.*), we find *thisoa*, Mén., placed between two species, each as generically distinct from it (however similar they may be in coloration) as *fieldii*, Mén., and *aurora*, Esp.

In founding this new genus of Pierinæ, I am not unmindful of the fact that the old genus should be retained to include the earlier species, and this I have done in retaining *palæno*, Lin. ('Faun. Suecica,' p. 1041), in the genus *Colias*, and making *edusa*, Fab., the type of my new genus.

ERIOCOLIAS, gen. nov.

Allied to *Meganostoma*, Reak. Male with a black or rufous-black band on outer margins of primaries and secondaries, never spotted as in the female, but often traversed along the nervures by faint streaks of the ground colour; having on the superior surface of secondaries, between the costal and subcostal nervures, a patch of modified scales of a smaller size, and much more crowded than the surrounding ones, usually of the same ground colour. Females similar to those of *Colias* proper. Type, *edusa*, Fab. Other species which fall into this genus are: *myrmidone*, Esp.; *fieldii*, Mén.; *vautierii*, Guér.; *meadii*, Edw.; &c.

After the separation of *Eriocolias*, it will be found that the species of the old genus arrange naturally into two groups, which may eventually be generically separated; but as yet I fancy this cannot be done satisfactorily till we know more of the local forms of some of the more arctic species allied to *palæno*, *pelidne*, *philodice*, and *eurytheme*. I have varieties of *eurytheme*, Bois., and *philodice*, Godt., which approach *pelidne*, Bois., very closely; and I have transitional varieties between *eurytheme* and *keewaydin*, and *eurytheme* and *ariadne*, both varieties taken along with *eurytheme* in the mountains of Nevada at 7000 feet altitude.

The two groups into which *Colias*, Fab., resolve themselves are:—

I. Males having the bands as in *Eriocolias*, but the basal patch of scales as found in *Eriocolias* being absent. Females with a more or less complete row of spots situated in the internervular spaces along the border of primaries and secondaries, but as the marginal fascia of secondaries is not usually so broad as that on the primaries, the inner portions of the spots are indistinct and suffused, except in abnormally dark varieties. Type of this group is *chrysotheme*, Esp.; others in the group being *thisoa*, Mén.; *eurytheme*, Bois.; *keewaydin*, Edw.

II. Males and females similarly marked, the black fascia on all wings spotted, but rather more regularly than in the females of group I. Type, *phicomene*, Esp. Others in the section are—*hyale*, Lin.; *palæno*, Lin.

I had at first thought that *palæno* should be made the type of another section, as it differs from group II. in having both sexes with an unspotted fascia; but however different it may be from *hyale* in typical specimens in this respect, the connecting link to the rest of the group is made by the female variety *werdandii*, Herr-Schaff., which has a faintly-spotted marginal fascia; and as the chief characteristic of this group is the similarity of both sexes, I place *palæno* here.

The genus *Eriocolias*, however, affords a very sharp character of definition by its possession of the interesting secondary sexual character, the congested scale area on costal margin of secondaries; there is one point to which I might call attention in regard to these secondary sexual characters, and that is their constancy. I have only seen one specimen of *Eriocolias* which is without it, and that is a specimen of *E. fieldii*, Mén., in my collection from the N. W. Himalayas. This was received along with other typical specimens, and is in all respects (except the absence of the scale patch) perfectly typical. This aberration is equalled, but in an entirely opposite manner, by a male specimen of the Indian *Papilio paris*, Lin., in my collection, which has on the first median nervule (but in a less pronounced manner) the characteristic androconia normally found on median and submedian nervules of superior surface of primaries of *P. ganesa*, a species which is found flying in company with *P. paris*. It will be noticed that this streak of dark brown filamentous scales is found only on the nervule of *paris*, which is in *ganesa* and its allies the most endowed with this type of a secondary sexual character.

LIFE-HISTORY OF *TENTHREDOPSIS MICROCEPHALA*.

By Miss Chawner.

On the 8th of May, 1893, I captured two females of *Tenthredopsis microcephala*, and placed them with some live turf in a case I use for the purpose of breeding sawflies. No other flies were confined there while the *T. microcephala* were in it. The turf was composed of grass- and buttercup-roots. The next few days being dull, the flies remained apparently torpid, but May 15th was brighter, and they became lively, examining the turf, and evidently seeking a suitable leaf on which to oviposit. The result I copy from notes taken at the time.

May 15th, 1893.—One fly laid an egg on the under side of a buttercup-leaf, near but not touching one of the large ribs. Egg oval, brownish, in the centre of a largish blister. 16th–20th.—Several eggs laid daily, about twenty in all; two or three often close together on one leaf. 29th–31st.—Larvæ hatching. Length just under two lines, back deep bluish grey, sides and under sides greenish white. Vertex of head deep brown, face pale, eyes black, twenty-two legs, prolegs and claspers pale, claws brown. Larvæ eat irregular holes in the leaves, avoiding the large ribs, are sluggish, but not timid, lying curled up on the under side of leaves; after their first meal they develop a kind of *ardoisé* bloom. The eggs darkened in colour considerably about two days before hatching.

June 3rd–6th.—Larvæ much grown, have moulted, and appear bluish grey, with very dark if not quite black heads; *ardoisé* bloom over the whole body, which, when rubbed, shows a grey-green, semi-transparent skin; body cylindrical, not wrinkled, but striated under the bloom; dorsal line inconspicuous. They eat voraciously, chiefly at evening, lying curled up during the heat of the day. 8th–12th.—Larvæ moulted and came out green with dull olive stripes and olive dorsal line; head dark, especially on vertex; shape much thickened. In this stage they are shy, falling off the leaf if touched or alarmed, and ejecting a brown acrid liquid plentifully from their mouths. Length from 11–13 lines. 15th–22nd.—Larvæ moulted for the last time, appearing bright green all over, and ceased to eject liquid. Length 10–12 lines. They went down into earth, not spinning a cocoon, but lying in a cell of earth, very smooth inside, but crumbling as soon as handled. Seventeen went down.

March 20th, 1894.—Larvæ changed to emerald green pupæ.

April 2nd.—Pupæ turned black. 4th–6th.—Ten female flies hatched. 10th–12th.—Virgin eggs laid on buttercup-leaves. 13th.—One male fly hatched; it differed from the females in having the third and fourth segments of the abdomen dull red.

May 10th.—Eggs hatching, probably retarded by the wet, cold season. 21st–28th.—Several larvæ dwindled and died.

June 7th.—Larvæ turned green. 22nd.—The seven survivors went down into earth.

April 10th, 1895.—Two larvæ only survived the winter, these have now pupated. 22nd.—One male fly appeared, small, about seven lines, having red segments on the abdomen.

In Mr. Cameron's account of the Tenthredopsides (Phytoph. Hymenopt., vol. i. p. 102), it is stated that none of the larvæ are known; it is therefore much to be wished that this neglected group might attract more attention, as it is evidently not difficult to induce the females to deposit eggs, nor does it require much trouble to rear the larvæ. I have found larvæ of *Tenthredopsis microcephala* on cultivated chrysanthemum, and one of my flies laid eggs on a leaf of premorse scabious which had accidentally been placed in the case, but the eggs came to nothing.

Forest Bank, Lyndhurst.

A CATALOGUE OF THE MACRO-LEPIDOPTERA OF DERBYSHIRE.

By Fred. W. G. Payne.

(Concluded from p. 120.)

Uropteryx sambucaria. Common as regards the south; rarer at Bakewell.

Epione apiciaria. Repton, Winshill, Bretby, Barrow, Osmaston, and Little Eaton.—*E. advenaria.* Willington (E. Brown).

Rumia luteolata, L., =*cratægata*, L. Abundant everywhere.

Venilia macularia. Bakewell and Dovedale.

Metrocampa margaritaria. In fair numbers everywhere.

Ellopia prosapiaria, L., =*fasciaria*, Schiff. Breadsall.

Eurymene dolobraria. Repton, Derby, Barrow, and Ashbourn.

Pericallia syringaria. Barrow and Derby.

Selenia bilunaria, Esp., =*illunaria*, Hb. Common everywhere.—Var. *juliaria.* Has been taken by Rev. G. A. Smallwood.—*S. lunaria.* Occasionally taken.—*S. tetralunaria*, Hufn., =*illustraria*, Hb. Osmaston.

Odontopera bidentata. Common.

Crocallis elinguaria. Common.

Ennomos alniaria, L., =*tiliaria*, Bork. Ashbourn.—*E. fuscantaria.* Egginton, Derby, and Barrow.—*E. erosaria.* Larvæ at Repton Shrubs (Mr. Baker). Also recorded by Mr. Hill.—*E. quercinaria*, Hufn., = *angularia*, Bork. Repton Shrubs and Bretby Park.

Himera pennaria. Bakewell, Repton, and Barrow.

Phigalia pedaria, Fb., =*pilosaria*, Hb. Common throughout the county.

Nyssia hispidaria. Rare. Repton Shrubs.

Amphidasys strataria, Hufn., = *prodromaria*, Schiff. Repton, Findern, Newton, and Drakelow.—*A. betularia.* Common throughout the county.—Var. *doubledayaria.* Common almost everywhere.

Hemerophila abruptaria. Willington and Osmaston.

Cleora lichenaria. Recorded once (Rev. R. H. Fuller).

Boarmia repandata. Common.—*B. gemmaria*, Brahm., =*rhomboidaria*, Hb. Common throughout the county.—Var. *perfumaria.* Has been taken by Rev, G. A. Smallwood.

Tephrosia crepuscularia. Barrow. Common (Rev. R. H. Fuller).—*T. biundularia*, Bork., =*laricaria*, Dbl. Frequent south.—*T. punctularia.* Common in the southern districts.

Pseudoterpna pruinata, Hufn., =*cytisaria*, Schiff. Willington.

Geometra papilionaria. Repton, Willington, Derby, Cauldwell, and Barrow.

Phorodesma pustulata, Hufn., = *bajularia*, Schiff. Derbyshire (Newman).

Iodis lactearia. Common in the south, and of less frequent occurrence north.

Hemithea strigata, Müll., =*thymiaria*, Gn. Ashbourn.

Ephyra punctaria. Repton Shrubs and near Ashbourn.

Asthena luteata. Derby and Repton.—*A. candidata.* Common.—*A. sylvata.* Repton.—*A. blomeri*, Curt., =*pulchraria*, Ev. Bakewell, once (Rev. R. H. Fuller); once near Repton (W. Garneys), Hartshorn (T. Gibbs), Bakewell (Rev. C. F. Thornewill), Dovedale (J. Hill).

Eupisteria obliterata, Hufn., = *heparata*, Haw. Common in the southern portions of the county.

Acidalia dimidiata, Hufn., = *scutulata*, Bork. Common everywhere. —*A. bisetata.* Common in the south.—*A. virgularia*, Hb., = *incanaria*, Hb. Everywhere in the county. — *A. subsericeata*, Dovedale.— *A. immutata.* Recorded by Mr. Hill.—*A. remutaria.* Fairly numerous. — *A. fumata.* Dovedale. — *A. imitaria.* Barrow and Derby. — *A. aversata.* Common in the south.—*A. emarginata.* Barrow.

Timandra amataria. Fairly numerous in the south.

Cabera pusaria. Very common almost everywhere.—*C. exanthemata.* Almost everywhere.

Bapta temerata. Scarce (W. Garneys).

Macaria liturata. Seal Wood and Breadsall.

Halia vauaria, L., = *wavaria*, Fb. Common everywhere.

Strenia clathrata. Recorded once (Rev. R. H. Fuller).

Panagra petraria. Willington, Bretby Park, Repton, Breadsall, and Bakewell.

Numeria pulveraria. Once near Bretby (T. Gibbs); Breadsall (G. Baker).

Ematurga atomaria. Common everywhere in the county.

Bupalus piniaria. Common everywhere.—Var. *flavescens.* Breadsall Moor, common (G. Baker).

Abraxas grossulariata.—*A. sylvata*, Scop., = *ulmata*, Fb. Common throughout the county.

Ligdia adustata. Recorded by Rev. G. A. Smallwood.

Lomaspilis marginata. Everywhere.

Hybernia rupicapraria. — *H. leucophæaria.* — *H. aurantiaria.* — *H. marginaria*, Bork., = *progemmaria*, Hb.—*H. defoliaria.* Common throughout.

Anisopteryx æscularia. Common.

Cheimatobia brumata. Abundant everywhere.—*C. boreata.* Bakewell and Repton Shrubs.

Oporabia dilutata. Everywhere.

Larentia didymata. Abundant.—*L. multistrigaria.* Bakewell and Breadsall.—*L. cæsiata.* Common (Miss E. M. Alderson). Recorded twice (Rev. R. H. Fuller). Dovedale, common (H. F. Gibson).— *L. salicata.* Once at Bakewell (Rev. C. F. Thornewill).—*L. viridaria*, Fb., = *pectinitaria*, Fues. Abundant everywhere in the county.

Emmelesia affinitata. Common everywhere.—*E. alchemillata.* Occasionally in the south.—*E. albulata.* Abundant throughout the county.—*E. decolorata.* Common south. — *E. tæniata.* Dovedale (F. M. Spilsbury).

Eupithecia venosata. Repton, Little Eaton, Bakewell.—*E. linariata.* Frequent in the south of the county.—*E. pulchellata.* Common.— *E. oblongata*, Thnb., = *centaureata*, Fb. Repton Shrubs and Derby.— *E. subfulvata.* Winshill, Barrow, and Little Eaton.—*E. plumbeolata.* Common at Little Eaton.—*E. isogrammaria*, H.-S., = *haworthiata*, Dbl. Breadsall and Derby.—*E. pygmæata.* Recorded once, Bakewell (Rev. R. H. Fuller); Lathkil Dale and Bakewell (Rev. C. F. Thornewill); Wirksworth (Mr. J. Hill).—*E. castigata.* Common in the south.—

E. trisignaria. Repton Shrubs, common (Mr. G. Baker). Also recorded by Mr. J. Hill and Rev. G. A. Smallwood.—*E. fraxinata.* Derby, Barrow, and Willington.—*E. pimpinellata*, Hb., = *denotata*, Gn. Not common, Derby.—*E. valerianata*, Hb., = *viminata*, Dbl. Repton Shrubs, common (Mr. G. Baker); Kedleston Park (Rev. C. F. Thornewill). Also at Derby.—*E. indigata.* Breadsall (Mr. Hill and Mr. Baker); Bakewell (Rev. C. F. Thornewill).—*E. nanata.* Breadsall (Mr. Baker).—*E. subnotata.* Common in south-west.—*E. vulgata.* Fairly common almost everywhere.—*E. albipunctata.* Repton Shrubs and Breadsall, common (Mr. Baker).—*E. absinthiata.* Common.—*E. minutata.* Breadsall, common (Mr. Baker).—*E. assimilata.* Occurs throughout the county.—*E. tenuiata.* Repton and Breadsall.—*E. lariciata.* Bretby, Seal Wood, Breadsall, Bakewell, and Hartshorn.—*E. abbreviata.* Repton Shrubs.—*E. exiguata.* Common south. —*E. sobrinata.* Derby.—*E. pumilata.* Derby.—*E. rectangulata.* Common everywhere south of Bakewell.

Lobophora halterata, Hufn., = *hexapterata*, Schiff. Repton Shrubs.

Thera variata. Breadsall.—*T. firmata.* Recorded by Mr. J. Hill.

Hypsipetes ruberata. Hartshorn and Winshill.—*H. trifasciata*, Bork., = *impluviata*, Hb. Repton, Barrow, and Breadsall.—*H. sordidata*, Fb., = *elutata*, Hb. Common in the south.

Melanthia bicolorata, Hufn., = *rubiginata*, Fb. Seal Wood, Repton, Barrow.—*M. ocellata.* Bretby, Barrow, and Breadsall.—*M. albicillata.* Repton Shrubs, Seal Wood, Bretby, Ashbourn, Ambergate.

Melanippe hastata. Seal Wood.—*M. tristata.* Bakewell, common. *M. sociata*, Bork., = *subtristata*, Haw. Abundant throughout.—*M. montanata.* Abundant everywhere south.—*M. galiata.* Rare, Breadsall.—*M. fluctuata.* Common everywhere.

Anticlea rubidata. Barrow (Rev. G. A. Smallwood).—*A. badiata.* Common as far north as Bakewell.—*A. nigrofasciaria*, Göze., = *derivata*, Bork. Fairly common everywhere.

Coremia designata, Hufn., = *propugnata*, Fb. Common.—*C. ferrugata.* Fairly common.—*C. unidentaria.* Common in the south-west.

Camptogramma bilineata. Everywhere.—*C. fluviata*, Hb., = *gemmata*, Hb. Specimens have been taken near Willington. Newman says single specimens have been taken at Derby.

Phibalapteryx vittata, Bork., = *lignata*, Hb. Willington and Little Eaton.

Triphosa dubitata. Common everywhere.

Eucosmia certata. One at Barrow (Rev. G. A. Smallwood); Bakewell (Rev. C. F. Thornewill and Rev. R. H. Fuller).

Scotosia rhamnata. Dovedale.

Cidaria miata. Bakewell and Dovedale.—*C. corylata.* Common throughout the county.—*C. truncata*, Hufn., = *russata*, Bork.—*C. immanata.*—*C. suffumata.* Common throughout the south of the county.—*C. silaceata.* Common south, rarer north.—*C. prunata*, L., = *ribesiaria*, Bdv. Common everywhere.—*C. testata.* Common south.—*C. populata.* Occurs throughout the county, even on Kinderscout.—*C. fulvata.* Everywhere.—*C. dotata*, L., = *pyraliata*, Fb. Barrow and Bretby.—*C. associata*, Bork., = *dotata*, Gn. Occurs in the southern districts.

Pelurga comitata. Stapenhill, Chellaston, and Willington.

Eubolia cervinata. Barrow.—*E. limitata*, Scop., = *mensuraria*, Schiff

Fairly common south.—*E. plumbaria*, Fb.,=*palumbaria*, Bork. Dovedale, Barrow, and Breadsall.—*E. bipunctaria*. Fairly common in the north, unrecorded from the south.

Carsia paludata. Dovedale, rare.

Anaitis plagiata. Common throughout the county.

Chesias spartiata. Fairly common south.

Tanagra atrata, L.,=*chærophyllata*, L. Abundant throughout the length and breadth of the county.

Hughenden House, Derby, April 8th, 1895.

NOTES ON THE NEW ZEALAND VEGETABLE CATERPILLAR (*CORDICEPS ROBERTSII*).

During the last ten years some interesting notes have appeared in British and continental entomological periodicals on the New Zealand vegetable caterpillar. The following abstract of a paper by Sir Walter Buller, F.R.S., read before the Wellington Philosophical Society, February 20th, 1895, will add considerably to our knowledge of this peculiar product of the New Zealand forest.

"In the discussion," writes Sir Walter in his paper, "which followed the reading of Mr. Maskell's paper on November 4th, I maintained, in opposition to that gentleman's definition—'animal at one end, vegetable at the other,'—that the so-called vegetable caterpillar, as we now find it, is entirely vegetable substance. The author, as I understood him, contended that the body of the caterpillar had become permeated with vegetable tissue, but that the outer integument or skin was still dried animal matter. To put an end to any possible doubt on the subject, I forwarded to Sir James Hector a specimen of the vegetable caterpillar, and asked him to get it examined and tested by the Government analyst, for the purpose of ascertaining its true constituents. The following result has been officially communicated to me:—

"'Mr. Skey.—The question at issue is, whether the skin of the caterpillar remains, or if it has been converted into fungus like the soft internal tissues. The presence or absence of chitine will determine the question. Save the specimen for reference.—James Hector; Nov. 22nd, 1894.'

"'Vegetable Caterpillar.—*For animal matter in the so-called skin.* The skin does not give any indication of chitine or other animal substance. It burns without intumescence, and does not evolve the odour of nitrogenous matter in combustion.—William Skey; Nov. 23rd, 1894.'

"In the course of my remarks at the meeting, I stated that I had dug up in the woods hundreds of this singular product, and that in every instance that had come under my observation the caterpillar, in the living state, had descended into the ground tail-foremost, the stem of the fungus afterwards springing from a point between the back of the head and the first fold of the neck, and then ascending vertically to reach the light. Since that date I have been examining the specimens in my collection, and I have found one very curious example in which there is evidence of a different proceeding on the part of the caterpillar, with exactly similar growth of the fungus. In this instance the caterpillar had evidently buried itself head-foremost, and then turned its head slightly to the left, whereupon the fungus had commenced its stem-growth at the usual point, and travelled upwards in a line with the body, curving and twisting somewhat before emerging at the surface of the ground.

"In most specimens the stem is more or less twisted, and sometimes bifurcate before it reaches the surface, after which it assumes a perfectly erect character, the fructification being at the top, 3 or 4 in. of the terminal part being covered with closely-set spores, having externally a granulate appearance. The longest stems I have met with ordinarily measure 7 or 8 in. from the insertion to the extreme tip.

"I trust I have made myself sufficiently clear, but the peculiarity I have been describing is better seen on the accompanying plate (reduced from a photograph), in which fig. 1 represents this abnormal form. Figs. 2 and 3 on the same plate exhibit the vegetable caterpillar as it is ordinarily met with (upper and lower aspect), the smaller of the two showing the branched process I have mentioned, about an inch from its head. Fig. 4 illustrates the curved manner in which the caterpillar sometimes disposes its body before undergoing its final transmutation into fungus. The body of the specimen represented by fig. 1 measures 75 mm., and its stem, measured in a straight line, 150 mm. Although the caterpillars are of about equal size, the stem of No. 1, owing to its eccentric manner of growth, is 2–5 in. longer than that of No. 2. (The body of the largest caterpillar measures exactly 3 in. in length.)

"The popular notion that the vegetable caterpillar is found only under rata- and kauri-trees is quite an erroneous one. It is abundant in the southern parts of the North Island, where the kauri does not exist, and I have found it in localities from which the rata is absent,—for example, in small clumps of bush in the Taupo country. Indeed, it may be looked for in all suitable places, although, as a rule, it is more numerous near the summits of the wooded ranges, the fungus shooting up its little stem, like a miniature bulrush, among the dead leaves and decaying vegetation which cover the ground in such situations, often to the depth of several inches. After scraping away this surface-covering, it is necessary to dig out the vegetable caterpillar very carefully with a sheath-knife, the slightest attempt at forcing it up breaking the stem and destroying the specimen. Sometimes several are found grouped together within a foot of each other; but it requires a practised eye to distinguish the tiny stem among its surroundings of a similar hue. It is often rooted up and eaten by the wild pigs, and in the Taupo country I found the wood-hen digging up and devouring it. When fresh it has a pleasant nut-like flavour."

In this abstract I give Sir Walter's description of the plate accompanying his paper. The measurements and remarks on the plate should, I think, prove of interest in the absence of specimens. W. W. Smith.

Ashburton, New Zealand, March, 1895.

A FEW NOTES ON THE BUTTERFLIES OF BARBADOS.

By Sidney Crompton, F.E.S.

The existing published information about the Lepidoptera-Rhopalocera of Barbados (the most eastern of the Caribbee Islands) is not only scant and meagre, but also difficult of access. The chief or oldest authority on the natural history of the island is Mr. Griffeth Hughes, A.M., whose book on the subject was published in 1750. Copies of this book are exceedingly scarce. As might be surmised of a treatise published so long ago, it is not conspicuous for great scientific accuracy or lucidity of exposition. The full title of this rare volume is 'The Natural History of Barbados. In ten books. By the Reverend Mr. Griffeth Hughes, A.M., Rector of St. Lucy's Parish in the said island, and F.R.S. London. Printed for the Author; and sold by most book-sellers in Great Britain and Ireland. MDCCL.'

Our other source of information is 'The History of Barbados,' by Sir Robert H. Schomburgk, Ph.D., in one volume. In this book (published in 1848) there are two chapters devoted to natural history, one treating of organic nature as developed in Barbados, and one of animated nature. The first treats of the botany and marine sponges of the island, and the second chapter is given to a more or less popular account of the Radiata, Insecta, Arachnida, Crustacea, Mollusca, Fishes, Reptiles, Birds, and Mammalia.

Besides these two books, the one by Hughes and the one by Schomburgk, both now out of date and out of print, there is, of course, Charles Kingsley's well-known and delightful narrative, 'At Last.' This aims at being little more than a narrative of the author's impressions of the West Indian Islands, but incidentally there is much in the book treating of natural history, including some observations on the butterflies of Trinidad and other of the Windward Islands, but very little is said about Barbados.

Barbados is remarkably poor in its lepidopterous fauna. This poverty is no doubt caused by the absence of forest and uncultivated underwood in the island. Every part is cultivated for the sugar-cane, with the exception of that district known as St. Andrew's Parish, the central part on the eastern side, which contains the highest elevation, the largest stream, and a gas-jet called "the boiling spring." But, speaking generally, the island of Barbados may be described to-day in the words of John Reid, who, speaking of the island in a letter dated Aug. 5th, 1665, says it is one great garden, no less pleasant than fruitful, but now wholly given to sugar-cane. Every available acre is and always has been under cultivation, and to this must no doubt be ascribed its extreme poverty of lepidopterous insects.

Schomburgk states that occasionally one or other species of larvæ shows itself in prodigious numbers, but (fortunately for the vegetation) this does not occur frequently. It is recorded that in 1846, at Colleton, in Barbados, a field of sweet potatoes (*Batata edulis*), consisting of about ten acres, was deprived of its leaves in one night by the larvæ of a *Chœrocampa*, a sphingid moth. Of the nocturnal Lepidoptera of the Antilles, few have been described, and not one of these, says Sir Richard Schomburgk, is known to be in Barbados. I myself collected from the frangipanni-trees many larvæ of *Chœrocampa nechus*.

The following is Schomburgk's list of Antillean Heterocera*:—

Macroglossa tantalus, H.-S., Corr. Bl. p. 56.
Callionime parce, Fabr.
Philempelus labruscæ, Linn.
Chœrocampa nechus, Fabr.; *C. thorates*, Hübn.
Anceryx ello, Linn.; *A. obscura*, Fabr.
Amphonyx duponchelii, Boisd.
Urania sloaneus, Cramer.
Empyrema pugione, Cramer.
Euchromia parthenis, Fabr.
Decopeia ornatrix, Cramer.

Schomburgk only mentions two butterflies, *i. e.*, *Papilio polydamas* and *Callidryas marcellina*. The former of these two is found in Brazil, Honduras, and Jamaica; the latter is common to Venezuela, Guiana, Brazil, and Bolivia.

I myself have caught at Hastings (in Barbados), in November, numbers of *Danais archippus*, and one hereomorphic form of the same. There is a field (locally called "savannah"), near the Marine Hotel, Barbados, where the food-plant of *D. archippus* (*Asclepias curasavica*) grows in abundance; and here, in

---

* I hope to say something in a future paper about the synonymy of the Lepidoptera as given in Sir R. Schomburgk's list printed above.—S. C.

November, I captured numbers of imagines of the above-named *Danais;* they differed in no way from the typical *D. archippus.*

As Hughes's book on the 'Natural History of Barbados' is so rare, I give here his quaint and quite untechnical descriptions of Barbadian butterflies:—

"The Black-spotted Butterfly.—This is about three-quarters of an inch long. The back is covered with soft greenish down. The abdomen is divided into several annuli, or sections, tho' scarce perceivable. The antennæ are about half an inch long, and its legs six in number. It hath four very thin membranaceous wings, covered with very fine yellow mealiness. This mealy dust, when viewed through a microscope, appears to be so many quills, feathered with the utmost exactness and proportion. The body of this, as well as the following ones, is decked with a profusion of beauty, and all, in the words of the great Milton—

> . . . . 'wave their limber fans
> For wings, and smallest lineaments, exact
> In all the liv'ries deck'd of summer's pride,
> With spots of gold and purple, azure, and green.'

Should any one impertinently ask, 'What use these things are of in the creation?' he may be answered in the words of the ingenious Mr. Ray, that they are designed 'ad ornatum universi, et ut hominibus spectaculo sint; ad rura illustranda, velut tot bracteæ, infervientes. Quis enim eximiam earum pulchritudinem, et varietatem contemplans mira voluptate non afficiatur? Quis tot colorum et schematum elegantias naturæ ipsius ingenio excogitatas et artificiis penicillo depictas, curiosis oculis intuens, divinæ artis vestigia eis impressa non agnoscat et miretur?'

"The White Butterfly.—This exactly resembles the last described in every particular except its colour. These are chiefly to be seen flying about ponds of stagnated waters in the most beaten roads.

"The Dark-red Black-spotted Butterfly.—This is about an inch long from the head to the tail. Its antennæ are three-quarters of an inch long, and its two eyes black, round, and shining. The wings are of a dirty red, irregularly impanelled with black lists; and the margin or border of each wing much darker than the rest; and here and there adorned with many white spots, as well as the head, back, and breast. The abdomen is of a dark ferrugineous colour, and composed of seven annuli."

Are not these perfectly delightful diagnoses of Lepidoptera? There is something quite refreshing to the jaded student of scientific descriptions, whose tongue wearies of such phrases as "caputal squammation," "disco-cellular nervule," "serobiculate," and the like, in Mr. Hughes's comprehensive summary of a butterfly as having "pale red and whitish spots intermixed with the black." Now-a-days entomologists do not quote Milton and "the ingenious Mr. Ray," nor would a modern evolutionist call the ornamentation on a butterfly's wing "divinæ artis vestigia."

In conclusion, I earnestly advise all collectors going to the West Indies on an entomological expedition to go well provided with store-boxes, killing-bottles, pins, setting-boards, &c., &c., as such things cannot be bought in the islands, and great delay is caused by having to order them from England.

Salamanca, Santa Cruz, Teneriffe.

NOTES ON *ONTHOPHAGUS*, LATR.; WITH CORRECTIONS OF NOMENCLATURE, AND A DESCRIPTION OF A NEW GENUS.

By John W. Shipp.

Phalops, *Erichs.*, Wiegm. Archiv. 1848, p. 103.

= Ephillopus, *Reitter*, Verh. des Naturf. Vereines in Brun. xxxi. p. 168, 47.

Type: *ciconia*, Fabr., Syst. El. i. p. 51; = *barbicornis*, Koll. MS.; = *corruscus*, Dej., Cat. 3rd ed. p. 156; = *iphis* var., Erichs., Naturf. Ins. iii. p. 764, note 4; = *iphis*, Oliv.

The genus *Phalops* was founded by Erichson for the reception of *Onthophagus ciconia*, Fb., in 1848.

Reitter in 1892 proposed the name *Ephillopus* for the group, taking for his type *iphis*, Ol.; but as *iphis*, Ol., is synonymous and congeneric with *ciconia*, Fb., Reitter's name *Ephillopus* will have to fall.

Erichson's subgenus *Monapus* (Wiegm. Arch. 1848) will have to be rejected, as he did not give any definite characters by which to identify it.

Chalcoderus, Er., is to be taken as the subgenus formed by *rudis*, Sharp, *maculatus*, Fb. = *signatipennis*, Dej., *ater*, Waterh., and allied forms.

Psilax, Erichs. (*l. c.*, p. 103), has for its type *pronus*, Fb.

Gonocyphus, Lansb. (Ann. Mus. Civ. di Genova, 1885, p. 382), contains the following species: (*Onth.*) *obliquus*, Fb., *angulatus*, Redt., *lenzi*, Har., *æsopus*, Lansb., *gibbicollis*, Lansb., and allied forms.

I append a list of species, with their synonymy and alterations of nomenclature:—

Onthophagus, *Latr.*

1. *gorhami*, Shipp,
   = *granulifer*, Reitter, V. N. Vereines, Brun. xxxi. 1892, p. 83.
   Hab. Algeria.
2. *granulifer*, Har., B. E. Z. xxx. 1886, p. 142.
   Hab. Orange Free State (South Africa).

3. *humator*, Shipp,
   = *humeralis*, McLeay, P. L. S., N. S. W. (2) iii. p. 903, 1888.
   Hab. King's Sound (Australia).
4. *humeralis*, Raffr., Revu. Zool. 1877 (3) v. p. 322.
   Hab. Abyssinia.
5. *hector*, Shipp,
   = *haroldi*, Per., T. S. Afr. Phil. Soc. iv. 1888, p. 97, pl. i. figs. 5–8.
   Hab. South Africa.
6. *haroldi*, Baillon, Bull. Mosc. 1870, p. 332.
   Reitter, Ver. Nat. Vereines. Brun. xxxi. 1893, p. 80.
   Hab. Turkestan.
7. *variegatus*, Fabr., Ent. Syst. Suppl. p. 36.
   Hab. Ind. Or.
8. *filicornis*, Har., Col. hefte xi. p. 107,
   = *variegatus*, Roth. (*nec* Fb.). Wiegm. Archiv. 1851, i. p. 125.
   Hab. Tigre.
9. *truncaticornis*, Schall., Abhandl. Halle. Ges. 1783, p. 238.
   Hab. Malabar.
10. *trucidatus*, Har.,
   = *truncaticornis*, Boh. (*nec* Schall.), Ofvers. Vet. Ak. Forh. 1860, p. 113.
   Hab. N'Gamè, South Africa.
11. *Truncaticornis*, Herbst., is a synonym of *æneus*, Fabr.,
   = *spinifex*, ♀, Fabr.
12. *nitidior*, Bates, Bio. Cent. A. Col. ii. (2), 1887, p. 67, pl. v. f. 1, 1 *a*.
   Hab. Mexico.
13. *blackburni*, Shipp,
   = *nitidior*, Blackburn, Tr. R. S. S. Austr. xv. p. 209, 1892.
   Hab. New S. Wales.

I venture to take this opportunity of describing a new genus as follows:—

TAURONTHOPHAGUS, *mihi*.

This genus is distinguished by having the head furnished with two very long branching horns, extending from the centre of the head over and beyond the posterior margin of the thorax, and with a small rounded dilation towards the extreme apex, and a small tooth pointing inwards near the base. The humeral prominences are produced into a distinct dilated strong tooth, the apex slightly leaning towards the suture. The posterior margin of the thorax is very strongly emarginated, the centre being produced into a slight scutellary projection, which overlaps the scutellary space. Abdomen is compressed towards apex, and rather convex. Pygidium thickly covered with hairs.

Type of the genus, *O. rangifer*, Klug, Monatsb. Berl. Ak. 1855, p. 652; Peter's Reis. 1862, p. 228, t. 13, f. 12.

Hab. Sena, Natal.

Oxford, 1895.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 158.)

Caradrina quadripunctata, *Fb.*—Everywhere very numerous. The varieties *cubicularis*, Haw., and *superstes*, St., occur not uncommonly; the former being the pale grey form with distinct markings, and the latter a dark one very slightly marked.

Rusina tenebrosa, *Hb.*—Generally distributed, but local and rarely abundant. The following few localities do not at all represent the distribution, as collectors frequently neglect to record its occurrence. The var. *obscura*, Tutt, is more common than the type at Killarney and elsewhere. Belfast (*W.*); Castle Bellingham, Co. Louth, abundant (*Thornhill*); coast of Waterford, Dunmore and Tramore; Killarney; Ballynahinch, Connemara; shores of L. Gill; and Markree, Co. Sligo.

Agrotis vestigialis, *Hufn.*—Very generally distributed round the Irish coast, in some localities rather rare. The type with whitish ground colour is scarce. I have taken it at Donegal, Arklow, and Youghal. The aberration with the cuneiform dashes extending to the outer margin sometimes occurs; ab. *lineolata* Tutt: var. *sagittiferus*, Haw., is, I think, the most abundant form, and occurs at Sligo, Donegal, on the shores of L. Foyle, and on the sandhills of the Wexford and Wicklow coasts, &c.; and with it I have taken a few with obsolete markings, ab. *trigonalis*, Esp. A not unusual form is that with a warm ochreous ground colour, var. *clavis*, Esp., which Mr. Tutt notes as so common near Sligo. I have also found it at Ballinskelligs Bay, Co. Kerry; Youghal, Co. Cork; and Magilligan, Co. Derry. A very dark fuscous form, var. *nigra*, Tutt, is frequently to be met with in company with the pallid type, at Arklow, Co. Wicklow; and I have specimens of it from Wexford and Sligo. I append a few other general localities for this species. Howth and Co. Dublin coast generally, rather scarce. Pretty common on the sandhills of Loughs Foyle and Swilly; Sheephaven and Inver, a few, Co. Donegal; Portrush and Antrim coast, abundant (*C.*); at Greenore (*J.*), and Castle Bellingham, Co. Louth (*Thornhill*).

Agrotis puta, *Hb.*—Colonel Partridge reports the capture of one specimen near Enniskillen in 1893.

Agrotis ypsilon, *Rott.* (*suffusa*, *Hb.*)—Common and often pretty abundant. The markings vary in intensity in both sexes, the males sometimes having a very pale ground colour with very distinct design; but often the costal half of the fore wings is darkly shaded with brown, with the markings not sharply pencilled. The females sometimes are of a very black ground colour. Mr. Tutt's specimen from the Isle of Lewis, named *pallida*, corresponds to a male and female I have from Kenmare and Enniscoe, Co. Mayo, with very whitish outer marginal area; the female having the rest of the wing very black.

(To be continued.)

NOTES AND OBSERVATIONS.

Sericoris ingratana, sp. nov.—I have a very fine specimen of a Tortrix which I bred from balsam about five years ago. It has been examined by Messrs. Barrett, Webb, and others, but remained undetermined until I sent it to Lord Walsingham, who returned it with the remark that it was a *Sericoris* allied to *S. palustrana*. I now therefore propose to name it *S. ingratana*. It is a dull-looking insect, like the dark form of *S. latifasciana*. There is a broadish regular band across the centre of the fore wing, and a narrower band between it and the outer margin; beyond the second band is a small white spot. Cilia grey, with a faint dull spot near the inner margin. From *S. palustrana* this species differs in colour of ground and cilia, and in the absence of silvery marking. — J. B. Hodgkinson; Rosebery House, Ashton-on-Ribble.

Colour-changes in Plusia chrysitis.—With regard to Mr. W. D. Thornhill's remark as to *P. chrysitis* (*ante*, p. 159), and the two shades of bronze, *viz.*, the golden and the green-bronze, the suggestion that it is due to age of the specimen is, in my opinion also, the correct one. In 1892 I noticed the point of difference, and made a few experiments to see if the theory was correct, and so far as I went it was. The few specimens that I bred were of the golden tinge, whilst aged specimens taken with the net always showed the green hue. In the forthcoming summer it would be interesting to rear some specimens, note the shade, and then keep them alive as long as possible to see if any appreciable change in tint occurs.—W. J. Kaye; Worcester Court, Worcester Park, Surrey, May 2nd, 1895.

Hybernia defoliaria in March.—Mr. South (*ante*, p. 89) points out that this species has been met with as late as March 4th. It may therefore be of interest to state that I took a female example at Addington on March 13th last.—T. B. Fletcher; April 19th, 1895.

Nyssia pomonaria. — This species is figured in Eleazar Albin's 'Natural History of English Insects,' published in 1749. Description of Plate 97:—The caterpillar (*a*) was a kind of looper; it was hairy (which is not very common amongst them), and beautifully marked with several colours. It was found on the hazel the first of June, and on the 14th of the same month it went into the ground and changed into a chrysalis (*b*); and at the beginning of April came the moth (*c*, *d*). —C. W. Dale.

CAPTURES AND FIELD REPORTS.

Vanessa polychloros in Surrey.—Seeing that Mr. Grover, of Guildford, states in his article (*ante*, p. 150) that *Vanessa polychloros* is rare in the immediate vicinity of Guildford, it may be of interest to know that here in Cranleigh (situated about eight miles to the east of Guildford) the above insect is far from being rare, it being especially abundant in 1894; the chrysalids were quite common objects, hanging under eaves, porches, &c., anywhere in the neighbourhood of limes or elms, although I believe many fell a prey to ichneumons.—Harold E. Winser; Kent House, Cranleigh, April 27th, 1895.

Notes from Reading.—The season has opened well here for the entomologist, though about ten days later than last year. Such Lepidoptera as *Hybernia rupicapraria*, *H. leucophæaria*, *H. progemmaria*, and *Anisopteryx æscularia* have been plentiful on lamps, pales, and tree-trunks. *Cymatophora flavicornis*, abundant on the young birch-stems. *Amphidasys prodromaria*, not very plentiful this year. *Nyssia hispidaria*, scarce; I only took five males, this being the third year of its capture in this district. *Larentia multistrigata* and *Pachycnemia hippocastanaria*, fairly plentiful. *Brephos parthenias*, in abundance, flying over the tops of birch-trees. *Lobophora lobulata*, beaten from birch in fair numbers. April 10th, I searched for *Endromis versicolor;* saw only one male flying, but was fortunate enough to capture three females on the birch-twigs, one of which laid a large batch of fertile ova, from which I am rearing a fine colony of larvæ, now in their third coat. Sallows did not pay about here, but sugar did; I took *Tæniocampa gothica*, *T. cruda*. *T. stabilis*, *T. instabilis*, and *T. munda; T. cruda* literally swarming one or two nights. I worked well for a fortnight, sugaring for *Dasycampa rubiginea*, but failed to take it this spring, although I have taken it here for the last five years: one at sugar, autumn, 1891; three, autumn, 1892; nineteen, autumn, 1893; one last spring. I captured two females at sugar, from which I reared considerably over 200 imagines. I have also taken *Notodonta chaonia*, *Stauropus fagi*, and *Psyche opacella* larvæ. *Leucophasia sinapis* is very plentiful again this year in its usual haunts.—W. Barnes; 7, New Road, Southern Hill, Reading, May 13th.

Orgyia gonostigma.—On May 14th I was out with a friend, looking for larvæ, when I was greatly surprised to find a beautiful larva of *Orgyia gonostigma*, sunning itself on a leaf of the common meadow-sweet. Further search revealed seven more, two of which were feeding on meadow-sweet and five on dwarf willows. This insect must be a somewhat general feeder, as I am now feeding the larvæ on elm; and last summer we found one about a mile from the same place feeding on wild apple-leaves.—H. W. Shepheard-Walwyn; Hertford College, Oxford.

Note on Asphalia flavicornis.—Mr. Arkle, in speaking of *A. flavicornis* (*ante*, 163), says: "Yet the moth is seldom found in spring." We certainly take it here plentifully enough during the first or second week in March, by searching the low birches or underwood. I know of no moth more easy to find in such situations, but on the old birches it is certainly difficult to see; we also take it at sugar. Perhaps Mr. Arkle's remark applies only to the district in which he usually works; yet I cannot help thinking if it was worked for systematically it would be found in some abundance even there.—A. H. Hamm; Reading, May 2nd, 1895.

Spilosoma lubricipeda var. fasciata, *Tugwell.*—On May 6th, 1893, I captured here, on a gas-lamp, a specimen of this variety. It agrees exactly with the figure in Entom. xxvii. 207, except that the transverse fascia on the secondaries is lacking. Mr. E. F. Studd, to whom I showed the specimen, says that it is identical with specimens of this variety which he had received from Mr. Tugwell. This capture seems to me worthy of record, since, so far as I know, all previous specimens of this variety have been taken in Lincolnshire and the adjacent counties, and not in the south of England.—T. B. Fletcher; 78, Thornlaw Road, West Norwood, S.E.

Aëpophilus bonnairii.—While hunting on the shore, about half tide, at Mount Batten, in front of the coast-guard station, on the 28th instant, Mr. J. H. Keys and myself were rewarded by the capture of a mature specimen of *Aëpophilus bonnairii,* and twenty *Aëpus*, the majority of which were *A. robinii.* I may add that subsequently Mr. Keys took several *Aëpophilus bonnairii* in the same locality, some mature, the majority immature.—G. C. Bignell; Stonehouse, April 29th, 1895.

SOCIETIES.

Entomological Society of London.—*March 20th*, 1895.—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. Claude Morley, of London Road, Ipswich; Mr. Herbert E. Page, of 14, Nettleton Road, New Cross, S.E.; Mr. W. W. Smith, of Ashburton, Canterbury, New Zealand; and Mr. Henry Tunaley, of 30, Fairmont Road, Brixton Hill, S.W., were elected Fellows of the Society. Mr. H. St. John Donisthorpe exhibited a living female of *Dytiscus marginalis* with elytra resembling those of the male insect. Dr. Sharp said he had seen this form before, but that it was very rare in this country, though abundant in some parts of the palæarctic region. Professor Stewart asked if the genitalia had been examined. Mr. Champion stated that Mr. J. J. Walker had collected several females of an allied species (*D. circumflexus*) at Gibraltar with elytra resembling those of the male. Dr. Sharp exhibited specimens of *Brenthus anchorago*, from Mexico, showing extreme variation in size. He remarked that the males varied from 10⅛ mill. in length to 51 mill.; the female from 9½ mill. to 27 mill. In the male the width varied from 1⅓ mill. to 4 mill. The length therefore varied from about 5 to 1, and the width from 3 to 1 in the male. Mr. Blandford commented on the difficulty of mounting minute Lepidoptera, Diptera, Neuroptera, &c., and exhibited samples of strips of material which he had found most suitable for the purpose of staging minute insects. He said his attention had been called to this method of mounting by the receipt of specimens from Dr. Frič, of Prague. On examination of the material he had found it to be a fungus, *Polyporus betulinus.* He stated that Lord Walsingham had expressed his satisfaction with this material, and had sent him specimens, similarly mounted, from Zeller's collection. Mr. McLachlan remarked that he thought the material exhibited preferable to artichoke pith, which had been used for a similar purpose. Mr. Goss exhibited a species of a Mantid, *Pseudocreobotra wahlbergi*, Stål, received from Captain Montgomery, J.P., of Mid-Ilovu, Natal. He said he was indebted to Mr. Champion for determining the species. Mr. Frederick A. A. Skuse communicated a paper entitled "On a Colour Variety of *Heteronympha merope*, Fab., from New South Wales," and sent coloured drawings of the typical form and the variety for exhibition. Mr. Oswald H. Latter read a paper entitled "Further Notes on the Secretion of Potassium Hydroxide by *Dicranura vinula* (imago) and similar Phenomena in other Lepidoptera." The paper was illustrated by the oxy-hydrogen lantern. Professor Meldola congratulated Mr. Latter on the thorough way in which he had worked out his experiments, and said that in view of the small quantity of material at his disposal, the concordance in the results was remarkable. He added that Mr. Latter had, for the first time, proved the secretion of free potassium hydroxide in the animal kingdom. Mr. Blandford, Mr. Merrifield, Mr. Latter, and Mr. Dixey continued the discussion. Mr. Merrifield read a paper entitled "The Results of Experiments made last season on *Vanessa c-album* and *Limenitis sibylla*." This was illustrated by an exhibition of specimens of *L. sibylla*, and a long series of *V. c-album*, to show the effects of temperature in producing variation. Dr. Dixey said that many of the forms of *V. c-album* exhibited reminded him of *V. c-aureum*, a Chinese species, which he believed to be the oldest form of the genus. He thought that much of the variation shown in this series of specimens was due to atavism, and was not altogether attributable to the effect of temperature. Mr. Barrett said he was interested to find that one of the forced forms of *L. sibylla* was similar to a specimen he had seen which had emerged from the pupa during a thunderstorm. In connection with Mr. Merrifield's paper Mr. F. W. Frohawk exhibited a series of 200 specimens of *V. c-album* bred from one female taken in Herefordshire, in April, 1894. The series consisted of 105 males and 95 females, and included 41 specimens of the light form and 159 of the dark form. Professor Meldola, in proposing a vote of thanks to Mr. Merrifield, Dr. Dixey, and Mr. Frohawk, said that he was glad to think that the subject of seasonal dimorphism, which had been first investigated systematically by Weismann, was receiving so much attention in this country. He was of opinion that the results hitherto arrived at were quite in harmony with Weismann's theory of reversion to the glacial form, and all the evidence recently accumulated by the excellent observations of Mr. Merrifield and others went to confirm this view as opposed to that of the direct action of temperature as a modifying influence. Mr. Merrifield, Mr. Barrett, and Dr. Dixey took part in the discussion which ensued.—H. Goss, *Hon. Sec.*

April 3rd.—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. C. J. Gahan exhibited two examples, male and female, of a rare Prioned beetle, *Charica cyanea*, Serville, which had been kindly sent to him for examination by Mons. René Oberthür; and stated that Lacordaire was mistaken with regard to the sex of the specimen which he described in the 'Genera des Coléoptères.' He pointed out that the elytra of the male were relatively much shorter than those of the female, and that the joints of the antennæ from the third to the tenth were biramose. Mr. Gahan also exhibited two species of the genus *Decarthria*, Hope, and said he believed these were the two smallest species of Longicorns known. Dr. Sharp exhibited the soldiers and workers of a species of Termites found by Dr. Haviland in South Africa. He stated that these insects possessed eyes and worked in daylight like hymenopterous ants, and that in habits they resembled harvesting ants by cutting grass and carrying it into holes in the ground. Dr. Sharp said that although these holes were probably the entrance to the nests, Dr. Haviland was unable to find the actual nest, even by prolonged digging; so that the winged forms were still unknown. He thought this species was probably allied to *Termes viarum* of Smeathman, in which the soldiers and workers possessed eyes, and had been observed by Smeathman to issue from holes in the ground, and whose nest could not be discovered. Mr. McLachlan observed that it was possible there might be species of Termites without any winged form whatever. Mr. Rye called attention to the action of one of the Conservators of Wimbledon Common, who, he stated, had been destroying all the aspens on the Common. He enquired whether it was possible for the Entomological Society to protest against the destruction of the trees. Mr. Goss said he would mention the matter to the Commons Preservation Society. Mr. Francis Galton read a paper entitled "Entomological Queries bearing on the question of Specific Stability." The author said that the information desired referred to:—(1) Instances of such strongly marked peculiarities, whether in form, in colour, or in habit, as had occasionally appeared in a single individual in a brood; but no record was wanted of monstrosities, or of such other characteristics as were clearly inconsistent with health and vigour. (2) Instances in which any one of the above peculiarities had appeared in the broods of different parents. In replying to this question, he said it would be hardly worth while to record the sudden appearance of either albinism or melanism, as both were well known to be of frequent occurrence. (3) Instances in which any of these peculiarly characterized individuals had transmitted their peculiarities, hereditarily, to one or more generations. Mr. Merrifield stated that he received some years ago, from Sheffield, ova of *Selenia illustraria*, the brood from which produced, in addition to typical specimens, four of a dark bronze colour, and from these he bred a number of specimens of a similar colour. Dr. F. A. Dixey referred to a variety of the larva of *Saturnia carpini* with pink tubercles. He said the imago bred from this larva produced larvæ of which ten per cent. had pink tubercles. Professor Poulton said he had found larvæ of *Smerinthus ocellatus* with red spots, and that this peculiarity had been perpetuated in their descendants. Mr. McLachlan, Canon Fowler, and Professor Meldola made some further remarks on the subject. Mr. G. F. Hampson read a paper by Mr. C. W. Barker entitled "Notes on Seasonal Dimorphism in certain Species of Rhopalocera in Natal." Mr. Merrifield said he was of opinion that a record of the temperature at different seasons would be a very desirable addition to observations of seasonal dimorphism. Mr. Hampson said he believed that temperature had very little to do with the alteration of forms. At any rate, according to his experience, in India the wet-season form succeeded the dry-season form without any apparent difference in the temperature. Professor Poulton remarked that the apparent temperature as felt must not be relied upon without observations taken by the thermometer. Dr. Dixey, Mr. Barrett, Dr. Sharp, and Professor Meldola continued the discussion.—H. Goss & W. W. Fowler, *Hon. Secretaries.*

May 1st.—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. Oswald H. Latter, M.A., of the Charterhouse, Godalming, was elected a Fellow; and Dr. C. G. Thomson, of the University, Lund, Sweden, was elected an Honorary Fellow, to fill the vacancy caused by the death of Pastor Wallengren. Mr. Horace St. J. Donisthorpe exhibited a variety of *Rhagium bifasciatum*, a longicorn beetle, taken in the New Forest, in which the elytra were of a light testaceous colour. Mr. Waterhouse exhibited a living larva of a longicorn beetle found in a boot-tree which had been in constant use by the owner for fourteen years, the last seven of which were spent in India. The specimen was brought to the British Museum on May 6th, 1890, and was put into a block of beech wood in which it had lived ever since; it did not appear to have altered in any way during these five years. It had burrowed about eight inches, and probably made its exit accidentally. Mr. Blandford referred to a similar case which had come under his notice. Mr. C. G. Barrett exhibited a long series of the dark and strongly-marked varieties of *Agrotis cursoria* and *A. tritici*, taken on the sandhills of the north-east coast of Scotland by Mr. Arthur Horne, of Aberdeen. Mr. Dale exhibited a specimen of a *Sesia*—supposed to be a new species—from the New Forest. Mr. O. E. Janson exhibited a remarkable species of *Curculionidæ* from the island of Gilolo, having exceedingly long and slender antennæ and legs; it was apparently an undescribed species of the genus *Talanthia*, Pascoe. Mr. Nelson Richardson called attention to a paper by himself, in the 'Proceedings of the Dorset Natural History and Antiquarian Field Club,' on the subject of Dorset Lepidoptera in 1892 and 1893. Mr. W. L. Distant communicated a paper "On a probable explanation of an unverified observation relative to the family Fulgoridæ." In this paper the author cited the expressed opinions of certain naturalists as to the luminous properties of some species of this family. In the discussion which ensued Mr. Blandford said he thought further evidence was required on the subject of the alleged luminosity in the Fulgoridæ before the statements contained in Mr. Distant's paper could be accepted. Mr. J. J. Walker, R.N., contributed a paper entitled "A Preliminary List of the Butterflies of Hong-Kong, based on Observations and Captures made during the winter and spring months of 1892 and 1893." Professor Meldola commented on the interesting character of the paper from an entomological point of view, and the value of the observations therein on the geology, botany, and climate of Hong-Kong.—H. Goss, *Hon. Secretary.*

South London Entomological and Natural History Society.—*March 28th*, 1895.—T. W. Hall, F.E.S., President, in the chair. Mr. Ashby, Maida Vale, N.W., and Mr. H. Woods, Ashford, Kent, were elected members. Among the donations to the Society was a handsome lantern and screen, presented by Mr. Stanley Edwards. Mr. Fenn exhibited long series of *Selenia illunaria*, Hb., including a third brood. Mr. J. T. Carrington gave an interesting address entitled "Some Collecting Grounds and the Trees there," illustrating his remarks by a large number of lantern slides, admirably executed and kindly lent by Mr. Fred. H. Evans.

April 11th.—C. G. Barrett, F.E.S., Vice-President, in the chair. Mr. Winkley, on behalf of Mr. Montgomery, of Ealing, exhibited and read notes on a bred series of *Nyssia hispidaria*, Hb. One specimen was whitish, without the central band, and having only the transverse lines and apical streak dark grey; another example was uniformly smoky black. Mr. Edwards, male and female *Dynastor napoleon*, and a specimen of *Papilio martia*, from Brazil. A discussion took place as to the season, and the general opinion was that the present spring was some three weeks later than last year.

April 25th.—T. W. Hall, F.E.S., President, in the chair. Mr. Ashdown, of Leatherhead, was elected a member. Mr. Frohawk exhibited a variety of *Papilio machaon*, L., having ochreous yellow blotches at the anal angle, and the blue markings almost white. It was bred from Wicken larvæ. Mr. Mansbridge, three melanic specimens of *Phigalia pedaria*, Fb., taken by him this year near Barnsley, and remarked on the gradual extension of this variation. Mr. Adkin said that Mr. South had taken a black example of the female at Macclesfield. Mr. Moore, a specimen of *Pterostichus madidus*, F., which had been attacked by a *Gordius*. Mr. Turner, a specimen of *Plusia moneta*, Fab., which was taken at West Wickham in July, 1894, by Mr. Slade, of Gellatly Road, Hatcham; also a series of *Spilosoma menthastri*, Esp., two specimens having only a few small dots on the fore wings; three Scotch forms with a darker ground, and having the second line more or less complete, especially in one specimen.

May 9th.—The President in the chair. Mr. Williams exhibited a curious cluster of cocoons fastened on a twig in a caterpillar-like group. Mr. T. W. Hall, a variety of *Smerinthus ocellatus*, L., in which the ocelli were considerably obscured. Mr. Enock, specimens of the exceedingly rare fly *Polynema nutans*, Lub., one of the Mymaridæ, which inhabits water, and lays its eggs in those of the dragonfly. In describing it he said that it used its wings for swimming, and although observed first in 1862 by Sir John Lubbock, had only been seen once since. He himself had, until the present week, vainly looked for it. Mr. Mansbridge then read an interesting paper on "Prairie Insects," giving an account of the insect inhabitants of prairies in the Indian territory other than Lepidoptera. In the discussion which ensued Messrs. Pearce, Carrington, and Warne gave their experiences in similar regions.—Hy. J. Turner, *Hon. Report Sec.*

Birmingham Entomological Society.—*March 18th*, 1895.—Mr. P. W. Abbott, Vice-President, in the chair. Mr. C. J. Wainwright showed two specimens of a *Zygæna* from the New Forest, one of which was sent to him as *meliloti*, but which he thought was unsatisfactorily named; Mr. Abbott believed them both to be *trifolii*. Mr. R. C. Bradley showed a spider from Sutton which was much like *Formica rufa* in general appearance. Mr. P. W. Abbott, a nice series of *Hesperia actæon* from Lulworth. Mr. R. C. Bradley, a box from his collection containing, amongst others, the Psychidæ; and he gave a short description of the species, and remarked that they offered a good field for further work; one *Solenobia* he possessed Mr. Barrett believed to be new, and wished to see more specimens; it was taken in Wyre Forest. —Colbran J. Wainwright, *Hon. Sec.*

RECENT LITERATURE.

L'Amateur de Papillons. By H. Coupin. Paris: J. B. Baillière et Fils. Dec., 1894.

This profusely illustrated guide for the beginner in entomology comes opportunely at the opening of the season. Curiously enough, nearly all the species figured are found in Britain as well as on the Continent, and although the cuts leave much to be desired in the direction of clearness, they should be of considerable use to the isolated collector in naming his captures. We find chapters on Physiology, Protective Resemblance, Polymorphism, &c.; but it is in the sections devoted to the various methods of collecting that the author is strongest. Its chief merit lies in bringing under one cover a large amount of detailed information which is of great value to the young student, and we wish that some such complete handbook to collecting existed in English.

There are some very interesting records upon the migration of *Vanessa cardui*, which, appearing from the south in immense numbers, is supposed to come from Africa, assisted by the warm winds in spring; and, as has been noted in England, the painted lady is usually accompanied by *Plusia gamma*. *Sphinx convolvuli* is in the same way cited as migrating to Europe from Algeria. W. M.

Wayside and Woodland Blossoms: a Pocket Guide to British Wild Flowers, for the Country Rambler. By Edward Step. 173 pp., with 128 coloured and 22 plain plates. London and New York: Frederick Warne & Co. 1895.

The author, putting aside technicalities to a large extent, has prepared a convenient guide for the plant-collector; and the descriptions, which are written in a clear and intelligible manner, together with the figures, should enable any one to determine almost every species of wild plant that he may meet with in his wanderings, or that he may wish to become acquainted with.

To the entomologist, and especially to the lepidopterist, a knowledge of field botany is of considerable importance. To those, therefore, interested in insects and desiring to learn how to know and where to find the plants upon which they feed, we can commend this handy little volume.

A Plum-Scale in Western New York. By M. V. Slingerland. Bulletin 83, Cornell University Agricultural Experiment Station, Entomological Division. Dec., 1894.

A "plum-scale" has recently been noticed to seriously menace the welfare of plum-trees in New York orchards. It seems, however, that so far the life-history details of the pest have not been fully ascertained, and that even its name has not been determined beyond the fact that it is a species of *Lecanium*, possibly *L. juglandis*, Bouché. Although it chiefly attacks plum-trees, the "scale" has been observed on other fruit-trees in a lesser degree. Mr. Slingerland recommends "spraying the infested trees with kerosine emulsion diluted with four parts of water," and impresses upon the operator the paramount importance of hitting each little scale with the liquid.

THE ENTOMOLOGIST

Vol. XXVIII.] JULY, 1895. [No. 386.

DESCRIPTIONS OF SOME NEW SPECIES OF SOUTH AMERICAN CHRYSOMELINÆ.

By Martin Jacoby, F.E.S.

In 1876 Kirsch has described, in the 'Deutsche Ent. Zeitsch.,' some species of *Doryphora*, and placed them in the genus *Chrysomela*, under which heading they figure also in the Catalogue of Duvivier. It is most remarkable that, although the genus *Doryphora* is about the most easily to recognize amongst the whole of the *Phytophaga*, and Kirsch knew well apparently this genus, he should have retained the name of *Chrysomela* for it, since this genus has no true representative in South America.

Doryphora sanguinipennis, n. sp.

Below metallic violaceous; head and thorax black, shining, nearly impunctate; elytra light red, very finely punctured in irregular rows, the sutural and lateral margins narrowly black. Length, 9 lines.

Head black, impunctate at the vertex; the clypeus very finely and sparingly punctured; the eight lower joints of the antennæ black, the others wanting; thorax strongly transversely convex, at least three times broader than long, the sides strongly rounded, narrowed at the base, the anterior angles mucronate, the disc shining, with some very fine punctures at the sides only, the centre impunctate, with a small fovea at the sides; scutellum black; elytra very convex, parallel, of reddish orange colour, very narrowly margined with black, the surface very finely, not very closely, punctured, the punctures very irregularly arranged in rows, the interstices impunctate; under side and legs violaceous blue; mesosternal process moderately long, acute, slightly curved.

Hab. Venezuela (my collection).

This large-sized species is of similar shape as *D. batesi*, and seems allied to *D. augur*, Stal, in coloration, but differs in the nearly impunctate thorax and the finely punctured elytra.

Doryphora obliquefasciata, n. sp.

Black; head and thorax greenish, opaque, finely punctured; elytra closely geminate punctate-striate, flavous, the suture and two transverse oblique bands, one before, the other below the middle, piceous or greenish. Length, 5 lines.

Head opaque, greenish, scarcely perceptibly punctured; labrum flavous; antennæ black, the lower two joints and the apex of the last one fulvous, the sixth to the eleventh joints widened, scarcely longer than broad; thorax three times broader than long, opaque, greenish, the sides straight at the base, rounded towards the middle and slightly widened, the anterior angles mucronate, the surface irregularly and very finely punctured, the punctures of equal size; scutellum black; elytra rather suddenly deflexed from the middle to the apex, strongly punctured in closely approached double and treble rows; the sutural margins greenish black, slightly widened towards the apex; a transverse curved band before the middle, not extending to the lateral margin, and another semicrescent band from the middle of the suture to the apex, but also interrupted at the latter place, piceous or greenish; the extreme lateral margin and the elytral epipleuræ blackish, as well as the under side and legs; mesosternal process long and curved.

Hab. Cameta, Amazons; also Para, Brazils (collections, M. Oberthur's and my own).

To be separated by the position, number, and shape of the elytral bands, and the colour of the suture, &c.

DORYPHORA MATHAMI, n. sp.

Greenish-æneous; thorax finely punctured, the sides pale greenish; elytra geminate, punctate-striate, pale greenish, a sutural band, widened towards the middle, greenish-æneous. Length, 4 lines.

Head greenish-æneous, very finely and somewhat closely punctured; labrum fulvous; antennæ metallic bluish or purplish, the lower two joints flavous below, the terminal joints widened; thorax about twice and a half broader than long, the sides nearly straight, anterior angles not mucronate, but pointed, the disc finely and irregularly punctured throughout, the centre occupied by a broad posteriorly widened æneous band, the sides pale greenish; scutellum æneous; elytra with about eight double rows of punctures, rather irregularly geminate, the punctures fine and piceous in colour, the disc pale greenish, a narrow sutural band, gradually widened at the middle, greenish-æneous; elytral epipleuræ pale greenish; under side and legs nearly black, with a metallic greenish gloss; mesosternal process short and stout; claw-joint without tooth.

Hab. St. Paulo d'Olivença (M. de Matham; collections, M. Oberthur's and my own).

Allied in coloration to *D. axillaris*, Stal, but differing entirely in the punctuation of the elytra and shape of the sutural band.

DORYPHORA PERUANA, n. sp.

Below greenish-black, above dark purplish; thorax finely and closely punctured, subopaque, the extreme lateral margin flavous; elytra very closely punctate-striate, each with four flavous small spots (1. 2. 1.). Length, 5 lines.

Head opaque, greenish, extremely finely but not very closely punctured; labrum flavous; antennæ blackish, the lower two joints flavous below, terminal joints moderately widened, longer than broad; thorax three times broader than long, the sides straight, rounded only in front of the anterior angles, the latter pointed, the surface very finely punctured, the punctures closely placed at the sides, more distantly at the middle, where there is a narrow smooth longitudinal space, the colour greenish, opaque, or darker purplish; elytra scarcely widened posteriorly, dark purplish, very closely and rather strongly punctured in semiregular rows, a small round spot at the middle of the basal margin, two others placed transversely at the middle, and a fourth near the suture and the apex, bright flavous; mesosternal process ong and straight.

Hab. Peru (M. de Matham; collections, M. Oberthur's and my own); also Amazons (Staudinger).

This species may be known principally by the flavous lateral margin of the thorax, and the sculpture and number of spots on the elytra; it seems allied to *D. fulvopustulata*, Baly, but differs in the elytral puncturing and number of the spots.

DORYPHORA BARTLETTI, n. sp.

Fulvous; the head with two, the thorax with four greenish spots, finely punctured; elytra finely punctate-striate, piceous, the third interspace and a narrow sublateral stripe, joined at the apex and at the base, flavous. Length, 3 lines.

Head finely granulate, with a few minute punctures at the vertex, fulvous, with two obscure metallic green elongate spots; labrum flavous; antennæ extending to the base of the thorax, the terminal five joints transversely widened, broader than long, the basal two joints stained with greenish-æneous above; thorax transverse, about three times broader than long, the sides perfectly straight, only rounded near the anterior angles, the latter mucronate, disc minutely granulate and sparingly punctured, like the head, fulvous, all the margins and four large spots placed transversely, greenish, slightly metallic; elytra very finely punctate-striate, the three sutural striæ regular, the others less so, a sutural broad and a lateral narrow band piceous, the third interstice as well as the ninth narrowly fulvous, the disc occupied by a broad somewhat irregularly-shaped piceous band, nearly divided at the middle by a flavous transverse stripe, the basal margin also flavous, and connecting the two elytral flavous stripes; elytral epipleuræ, under side, and legs fulvous; mesosternal process short and straight; legs with some obscure metallic greenish marks.

Hab. Peru, Yurimaguas (Bartlett; my collection).

Allied to *D. amabilis*, Baly, but differing in the finely granulate head and thorax, and in the elytral subsutural flavous stripe.

DORYPHORA PICEO-MACULATA, n. sp.

Piceous; the apical joints of the antennæ fulvous; thorax finely and remotely punctured; elytra olive-green, finely and closely punctate-striate, a sutural band strongly widened anteriorly, the lateral margins, a spot before and three other spots, placed transversely below the middle, piceous. Length, 7 lines.

Head finely and rather closely punctured; labrum fulvous; antennæ only extending to the base of the thorax, piceous, the last four joints fulvous, slightly widened; thorax three times broader than long, the sides very slightly rounded, the anterior angles thickened but scarcely produced, the surface convex, piceous, finely, irregularly, and remotely punctured throughout; scutellum piceous; elytra finely and rather closely punctate-striate, the punctures slightly geminately arranged; a narrow sutural band, which suddenly widens into a transversely-shaped patch below the scutellum, the lateral margins narrowly, a small spot placed below the base close to the sutural mark, and three similar spots placed transversely below the middle, as well as a spot at the base above the shoulders, piceous; mesosternal process short and stout.

Hab. St. Paulo d'Olivença (M. de Matham).

Of this species, which is nearly similarly marked to *D. javeti*, Baly, I received a specimen from Mons. Oberthur. It differs entirely from that species in the punctuation of the thorax and the elytra, and in their olive-green colour. In *D. javeti* the thorax is less transverse, more strongly punctured, and the elytral punctuation is finer and more remote.

DORYPHORA SEMIFULVA, n. sp.

Metallic greenish or bluish; the head with a fulvous spot; thorax very finely punctured; elytra fulvous, very finely and rather irregularly punctured, the interstices here and there finely aciculate. Length, 5—6 lines.

Head very finely and sparingly punctured, metallic green or blue, the vertex with a subtriangular fulvous spot, labrum piceous; antennæ extending to the base of the elytra, dark purplish, the terminal joints opaque, widened; thorax three times broader than long, metallic green or blackish, the sides straight at the base, rounded at the apex, the anterior angles mucronate, the disc very finely punctured, the punctures irregularly placed, slightly larger and more remote at the sides than at the disc; scutellum metallic green; elytra fulvous, with some very obscure darker patches or spots, finely, irregularly but rather closely punctured, the interstices here and there finely aciculate; mesosternal process strong but blunt, moderately long; claw-joint not toothed.

Hab. Bolivia (my collection).

Of the same coloration as *Cryptostetha procera*, Stal (*rufipennis*, Baly); but a true *Doryphora*, on account of the strongly produced mesosternum.

STILODES BOGOTAENSIS, n. sp.

Fulvous; lower joints of the antennæ black, the apical ones flavous; thorax with four black spots at base and apex; elytra bright flavous, a sutural band and two triangular patches before and below the middle, as well as the lateral margin, bluish black. Length, 3½ lines.

Head impunctate, reddish fulvous; lower six joints of the antennæ black above, the basal two flavous below, the terminal five joints pale flavous, widened; thorax nearly three times broader than long, the sides nearly straight, the anterior margin deeply concave, the surface reddish fulvous, remotely but distinctly punctured, two spots at the middle of the anterior margin and two larger ones at the base, all of transverse shape, black; scutellum black, elongate; elytra finely punctate-striate, the punctures extremely closely placed, the rows near the suture of irregular direction, the ground colour bright golden yellow, the suture with a broad dark blue band, narrowed at each end, the disc with a triangular blue patch from the base to the middle, and a somewhat smaller one near the apex, none of the patches extending to either margin (the posterior patch on one elytron is joined at one place to the sutural band below the middle), the lateral margin also blackish blue, this colour of wider shape from the middle to the apex; under side and legs fulvous; sides of the breast piceous; prosternum slightly raised; mesosternum strongly punctured.

Hab. Bogota.

This handsome species, of which I possess a single specimen, agrees almost entirely with *S. steinheili*, Jac., in the pattern and colour of the elytra, but differs in that of the antennæ, under side, and legs, and the spotted thorax.

DEUTEROCAMPTA TRANSVERSO-FASCIATA, n. sp.

Dark fulvous; labrum testaceous; thorax very remotely punctured; elytra regularly punctate-striate, flavous, a broad transverse band before, another below the middle and the sutural and lateral margins, narrowly dark brown. Length, 4 lines.

Head impunctate; labrum flavous; antennæ dark fulvous, the basal two or three joints paler, terminal joint longer than broad, extending to the base of the elytra only; thorax nearly three times broader than long, the sides straight at the base, slightly rounded in front, anterior angles produced forward, surface very remotely and irregularly punctured; elytra with rather regular striæ of fine punctures, those at the sides geminate, the sutural, lateral, and apical margins dark brown; a similarly coloured broad band is placed across the elytra before and another one below the middle, the former band does not extend to the lateral margin, but the posterior one is joined to it by a small point; mesosternum impunctate at the sides; claws simple.

Hab. Pernambuco.

Of this species two specimens are contained in my collection: one is marked as described; in the other the posterior band is of much broader, more triangular shape, narrowed at the suture, and does not touch the lateral margin; the apical joints of the antennæ in this specimen are also black instead of brown; otherwise there is no difference.

S. nigrozonata, Stal, seems a closely-allied species, but the antennæ, tibiæ, and tarsi are described as testaceous, and the elytra as "confusely punctured at the sides"; the abdomen is also said to have two testaceous spots.

CRYPTOSTETHA CYANEO-FASCIATA, n. sp.

Metallic blue; head and thorax opaque, impunctate; elytra deeply and closely punctured, the interstices rugosely convex, flavous, a deeply dentate and broad transverse band at the base, a narrower one at the middle and another near the apex, dark blue. Length, 5 lines.

Head opaque, dark blue, the vertex with a fulvous spot, finely granulate, with a few fine punctures anteriorly; labrum and palpi black; antennæ short, the terminal joints transversely widened, black, the lower joints shining; thorax three times broader than long, the sides very strongly widened and rounded at the middle, the surface sculptured like the head, with a few minute punctures at the sides; scutellum blackish; elytra very deeply almost foveolate-punctate, the punctures irregularly distributed, the interstices everywhere variolose or convex, a sutural and lateral narrow band, as well as three transverse very deeply dentate bands, dark blue, separated by narrow similarly dentate flavous intervals; the anterior two bands extend to either margin, but the apical one is shorter and does not touch the suture; the first band is very broad and of even width, but intersected by the narrow flavous basal margin and a narrow similarly-coloured stripe near the suture; the second band at the middle is greatly narrowed at the sutural portion and follows the first band in its indentations; lastly, the apical band is irregular in outline and does not extend to the suture; the under side and legs are metallic blue; the mesosternum is perpendicularly deflexed, as in all the species of this genus.

Hab. Rio grande do Sul, Brazils.

I have received two specimens of this handsome species from Dr. Staudinger; the system of coloration resembles nearly *C. dolabrata*, Stal, but the sculpture of the thorax and of the elytra is quite different.

THE RHOPALOCERA OF FLEET (NORTH HANTS) AND DISTRICT.

By S. G. C. Russell, F.E.S.

I was much interested in Mr. Grover's paper on the Rhopalocera of Guildford (*ante*, p. 150), and a similar account of the butterflies occurring at or near Fleet may be of some interest to entomologists. I have collected in the district regularly for the last five years (although I have had a much longer experience of it), and the insects enumerated below—a total of thirty-seven species—comprise only those personally taken or seen :—

Pieris brassicæ. In some seasons abundant.—*P. napi* and *P. rapæ.* Common.

Leucophasia sinapis. Mr. F. W. Frohawk, when I had the pleasure of his company in May, 1890, took a single specimen at Ewshot, and this is the only occasion on which I have met with this species in the district. By the way, there appears to be a somewhat general impression that this butterfly is seldom taken at rest. Quite the contrary was my experience at Sidmouth in 1893, when I took it in considerable numbers. The majority were taken at rest on flowers of some kind of vetch, evidently its food-plant. I have also taken the insect this year in Northamptonshire, and as far as I conld see it settled indiscriminately on any flower that happened in its way.

Euchloë cardamines. Abundant.

Colias edusa. Plentiful in 1892 (the *edusa* year), when specimens of the var. *helice* were also taken.—*C. hyale.* A few taken or seen in 1892, flying with *C. edusa.*

Gonopteryx rhamni. Very abundant, especially in the spring. Ova and larvæ are easily found on buckthorn (*Rhamnus catharticus*).

Argynnis selene. Very plentiful. A few specimens of a second brood occur in August.—*A. euphrosyne.* Common.—*A. adippe.* Fairly plentiful.—*A. paphia.* Fairly plentiful. I have not met with the var. *valesina.*

Melitæa aurinia (*artemis*). I did not meet with this species until 1892, and since then I have found its headquarters, where it occurs in some numbers, but is apparently restricted to a single field or meadow.

Vanessa polychloros. Occurs sparingly each year.—*V. urticæ*, *V. io*, *V. atalanta*, and *V. cardui.* Abundant in favourable seasons.

Apatura iris. A dead female found under an oak-tree ; and I am under the impression that I have seen specimens flying round oak-trees.

Pararge egeria and *P. megæra.* Common.

Satyrus semele. Abundant on heath-land.

Epinephele ianira, *E. tithonus*, and *E. hyperanthus.* Common.

Cœnonympha pamphilus. Common.

Thecla quercus. In 1888, when with two brother collectors, this species was found swarming round small birch-trees in a copse. Is not this an unusual occurrence ? I have not since seen this species in any numbers.—*T. rubi.* A few specimens occasionally seen ; probably locally common.

Polyommatus phlæas. Common.

Lycæna ægon. Very abundant on heath-land.—*L. alexis.* Common. —*L. argiolus.* Occurs in the spring, but not very commonly.

Nemeobius lucina. Locally abundant.

Syrichthus malvæ (*alveolus*). Common.

Nisoniades tages. Common.

Hesperia thaumas (*linea*) and *H. sylvanus.* Common.

Woking, June, 1895.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 181.)

Agrotis saucia, *Hb.* — Very local and usually scarce. I have noticed the following forms:—With unicolorous vinous coloration, ab. *rufa*, Tutt, Glandore and Castle Bellingham. Blackish grey with pale costa, ab. *ochrea costa*, Tutt, Howth, Derry, and Glandore. The same with vinous costa, ab. *saucia*, Hb., Howth. Pale brownish, Kingstown and Castle Bellingham. A dark form with obscure markings, Derry, ab. *majuscula*, Haw.? Localities:—"Dublin in 1855" (*B.*); near Kingstown, one; Howth, not scarce (*G. V. H.*); three at Tinahely, Co. Wicklow (*Bw.*); Killynon, several (*Miss R.*), and Cromlyn, formerly abundant (*Mrs. B.*), Co. Westmeath; Belfast, not rare (*Bw.*); Magilligan, one; Curzon, and near Derry and the coast of Antrim, abundant (*C.*); Kylemore, Connemara (*Hon. Miss Lawless*); Clonbrock, a few (*R. E. D.*), and Galway; near Crossmolina Co. Mayo, abundant (*S. R. F.*); Glandore, Co. Cork, not scarce (*D.*); Castle Bellingham, Co. Louth, in some numbers (*Thornhill*).

Agrotis segetum, *Schiff.*—Everywhere common. The vars. *subatratus*, Haw., and *nigricornutus*, Haw., are not uncommon. Var. *caliginosa*, Esp., and var. *fuscosa*, Esp., also occur.

Agrotis lunigera, *St.*—Local, and, I believe, widely distributed in Ireland, and often abundant. Until the wilder districts of the coast are more accessible for research by railways, hotels, or available lodgings, little can be known of the distribution of such littoral species as this. Although usually met with on rocky cliffs and wind-swept elevations, this insect also may be found on low reaches of shore. The larvæ may sometimes be found sheltered under solitary tufts of grass growing in the chinks of bare walls of rock. I am not familiar with English specimens such as those described by Mr. Tutt in 'British Noctuæ.' He speaks of the two sexes approximating often in colour and marking, even (in var. *suffusa*) "the hind wings of the males as dark on outer margin as in females." I have never seen this in Irish examples, and a large number have been examined or taken by me from time to time; the female here being always very distinct from the other sex; Mr. Tutt's description of var. *suffusa* well describes it, only varying in the intensity of the blackish ground and size of the white orbicular, which is sometimes much reduced. Generally the transverse lines are obsolete, and I have one very dark example with the ante-marginal line represented by a series of minute pale dots. I have not seen the var. *nigra*, Tutt, with both stigmata wholly or almost obliterated. Stephens's description of the type represents the strongly mottled form of the male commonly met with here, but I have never seen the rich fuscous colour, "variegated with yellowish." The male var. *pallida*, Tutt, is also met with, the ground being greyish white (without, however, the "slaty tinge"), and all striæ and markings strongly defined. The handsomest examples that have come under my notice of this form were taken by the Messrs. Thornhill, of Castle Bellingham. It also occurs at Dursey Island. Mr. Tutt's var. *virgata* is a not uncommon aberration, with a dark transverse band enveloping the reniform stigma, and a dark hind marginal area. Mr. Thornhill has also a remarkable male example of a uniform warm brown ground similar to that of the ordinary *A. exclamationis*, shaded with bands and striæ of darker brown, but almost as indistinctly as in *A. ypsilon*. Localities:—Abundant at Howth and Castle Bellingham (*Thornhill*), and I found it very abundant at Dursey Island on the coast of Kerry. It also exists on the Blaskets, Roche's Point, near Queenstown, and "on the coast of Cork," by Mr. Clear (*B.*).

Agrotis exclamationis, *L.* — Universally distributed and common, and with all varieties of ground colour, from pale clear brownish grey (var. *pallida*, Tutt) and rich ruddy brown (*brunnea*, Tutt) to a dark bistre brown. One or more of the stigmata are in some examples obsolete, or in some cases confluent, as in var. *plaga*, St.; and I have one example of var. *lineolata*, Tutt, figured by Newman. I have not met with var. *juncta*. Mr. Langham, of Tempo Manor, Co. Fermanagh, has a specimen with the reniform and claviform stigmata confluent, and a suffusion towards the base of wing. Mr. Thornhill has a fine example of var. *costata*, Tutt.

Agrotis corticea, *Hb.*—Local and sometimes fairly numerous. Varies from specimens with central area whitish grey (var. *irrorata pallida*, Tutt), through smoky grey forms, such as *irrorata fusca*, Tutt, and *subfuscus*, Haw., to a reddish brown with costal margin deeper in tone (the type), to blackish forms. It is by no means commonly met with in Ireland, and I have but few localities recorded for it. Tinahely, occasional (*Bw.*), and Greystones, Co. Wicklow, one; Castle Bellingham, Co. Louth, rather

scarce (*Thornhill*); Castlerock, Co. Antrim (*Bw.*); rare at Sligo (*Russ*); near Derry, one (*C.*); Clonbrock, Co. Galway, two (*R. E. D.*); near Kenmare, Co. Kerry, abundant.

[AGROTIS RIPÆ, *Hb.*—Mr. Birchall gives Malahide sandhills (Co. Dublin) as a locality, but as it has not been met with there or elsewhere, it may be possible that a form of *cursoria* with rather pale hind wings may have been mistaken for this species.]

AGROTIS CURSORIA, *Hufn.*—Locally abundant and apparently widespread on the Irish coast. It varies greatly in tints of ochreous to brown, but I have seen no approach to the slaty grey of var. *cærulea*, Tutt, nor in design to those with white reniform and orbicular stigmata from Shetland and Yarmouth. The darkest specimens I have met with are a few with ground colour of a cold bistre brown, well marked with transverse striæ, &c. Of named forms the following occur:—With obsolete markings, var. *armena*, Evers., Sligo (*Tutt*) and Arklow; and single specimens of unicolorous reddish brown, (?) var. *obscura*, Stgr., Ballinskelligs Bay and Drumanweir, Co. Donegal (*G. V. H.*). Var. *mixta*, Fab. is recorded by Mr. Tutt from Sligo. It is not uncommon at Magilligan Point, L. Foyle; near Donegal; and elsewhere. Var. *pallida*, Tutt, I have from Sligo and Arklow. Vars. *ochrea* and *brunnea*, Tutt, are recorded by him from Sligo. Localities:—Inver near Donegal, Carrablagh, and Drumanweir (*G. V. H.*); Bundoran (*W.*), and Buncrana (*C.*), Co. Donegal; Magilligan Point, L. Foyle, abundant; Castlerock, Co. Antrim (*Bw.*); Dundrum, Co. Down, scarce (*W.*); Castle Bellingham, Co. Louth (*Thornhill*); Arklow, Co. Wicklow; Youghal; Ballinskelligs Bay, Co. Kerry, abundant; and Knocknarea and Lissadell sandhills, Co. Sligo, abundant.

AGROTIS NIGRICANS, *L.*—Generally distributed and often fairly numerous. It varies by no means as much as in Great Britain. I have seen none of the very pale grey and reddish varieties. At Howth dark examples with warm brown ground are frequent, as well as blackish forms. The palest brown Irish specimens I have seen were taken at Castlerock, Co. Antrim, by Mr. Bristow. At Clogher Head, Co. Louth, the species is abundant, and I took there a nice series of very dark forms such as vars. *fuliginea*, *fumosa*, and *ursina*, Godt. I have an interesting aberration from Howth of a greyish brown ground colour, with the reniform and orbicular stigmata fused into a dark streak, that on the left wing preserving the orbicular without alteration of shape on the outer edge. Near Derry, scarce (*C.*). I have but few localities noted besides the above, but the species is very widespread in the south, and in Galway in the west, but scarcer inland.

AGROTIS TRITICI, *L.*—This very common moth seems in Ireland to be always of some tone of warm brown, except the darkest forms, which approach a sooty black. In Tutt's 'British Noctuæ' the prevailing colour of Irish specimens is correctly given as brown or reddish brown. Having collected this species in many localities in every littoral county in Ireland except Antrim, Down, Mayo, and Clare, I can speak from an extended experience. Irish *cursoria* and *tritici* therefore do not seem to run so nearly into one another as I believe they do elsewhere, neither species showing in Ireland such a range of colour-variation. Some forms of *tritici* without the costal and other streaks may approach the *cursoria* pattern, but the ground colour, as well as usually the shape of the wings, sufficiently distinguishes them. I have very rarely seen any of this species with any approach to greyish dusting, a character so strongly developed in some English specimens; nor have I ever met with the ochreous yellowish form. A rich brownish red, approaching the tint of *Noctua plecta*, sometimes occurs. The handsome dark varieties, variously marked, are found with the ordinary forms at Magilligan Point, Co. Derry; on the shores of L. Swilly, Co. Donegal, and elsewhere, but are scarce. The var. *aquilina*, formerly classed as a species, is not infrequent in many places. In size I have examples from one and a half inch in expanse to fifteen-sixteenths of an inch, which latter are almost devoid of any markings, a character frequently attending dwarfing. As to the characteristic markings of this species, those with a pale costal and longitudinal streaks are much less numerous generally than those without. I possess a few examples of the latter devoid also of the transverse markings. All the forms described by Tutt under letters H. I. K. L. occur, except var. *hortorum*, St.

[AGROTIS AQUILINA.—See under *tritici*.]

AGROTIS OBELISCA, *Hb.*—Very local, and decidedly scarce. I have seen none with the greyish coloration of Mr. Hodge's Isle of Wight specimens, and they rarely have such pale and distinct reniform and orbicular stigmata. The ground colour varies from vinous reddish brown to a dull mahogany, and the costa is sometimes ochreous, but occasionally, in the darker specimens, very slightly marked in paler tint of the ground colour. Mr. Birchall remarks that this species haunts the higher parts of Howth, while *tritici* rarely leaves the level of the sandhills. Besides that locality I have only met with *obelisca* on the cliffs of Minehead, near Dungarvan, Co. Waterford; and at Mt. Charles, Donegal. Mr. Campbell's record from near Derry I find to have been a mistake.

AGROTIS AGATHINA, *Dup.*—The Irish examples of this species are generally large, one and a quarter to one and three-eighths inches, and brightly marked, but very variable in colour and strength of pattern. The lightest I have ever seen is in the collection of Mr. Maurice Fitzgibbon, of Howth. The putty-coloured ground is traversed by grey striæ, and bears the black wedge-shaped space upon which are the reniform and orbicular stigmata, which is thrown into bold relief by the pale ground and broad costal streak of same tint. I possess another of a lavender-grey ground, somewhat shaded on the central area; the costal streak broad and whitish, the stigmata large and pale, the transverse striæ broadly pencilled in black edged with pale; a very distinct white ante-marginal waved line, broadened at the anal angle, is margined by a greyish black shading, which partly absorbs the cuneiform dashes. Hind wings very pale, with the ordinary shade and markings well represented. There is also a lavender-grey form almost unmarked except by a narrow costal streak, and the dark wedge bearing two small stigmata. The costal streak is often almost obsolete and of the ground colour, and the stigmata vary from almost white to a ruddy brown. All the above are aberrations, and not, as far as I know, stable varieties. Most of them are to be taken at Howth, together with the ordinary vinous-tinted form; a purple-brown one of the dark colour of *A. strigula;* and a pale rose-coloured one, var. *rosea*, Tutt. I have also met with a very dark specimen at Howth, and Mr. Dillon one at Clonbrock approaching var. *scopariæ*, Mill., but of full size and distinctly marked. This insect seems to vary extremely in comparative abundance in successive seasons. Usually scarce, and occurring sparingly; I have on occasions found it in abundance on a very restricted area of heather. Mr. Birchall used to take it by sweeping at night, but the specimens suffer considerably. The female when taken *in cop.* lays her ova freely on heather twigs in confinement, but I have never succeeded in rearing the larvæ through the winter; and even when taken almost full fed, they rarely survive to pupate. Localities:—Howth; near Derry, not common (*C.*); Clonbrock, Co. Galway (*R. E. D.*).

AGROTIS STRIGULA, *Thnb.*—Widely and generally distributed through Ireland wherever there are bogs or heathery hills. The ordinary form is somewhat variable in colour, and in the strength of the white markings. Sometimes a browner tint is observable, and in such specimens the pale markings are fainter, especially the streaks on the hind margin. I have noticed one red specimen, perhaps the var. *marmorea*, Gras., from Westmeath. It is unnecessary to adduce localities. It is very abundant on the Bog of Allen near Shannon Harbour, and Toberdaly, King's Co.; on the slopes of Slieve Beagh on the Tyrone side; at Oughterard, Connemara; and is not uncommon at Howth, Derry (*C.*), &c.

AGROTIS (ACETEBIA) PRÆCOX.—Very widely spread on the Irish coast. The larvæ suffer much from ichneumons, and from sea-gulls, who trace their trail on the sand and dig them up. Sometimes rather abundant, as at Magilligan, Co. Derry; Tramore, Co. Waterford; Dundrum, Co. Down (*W.*). I have not seen the bluish green form *præceps*, Hb. Localities: – Howth, Malahide, and Kingstown, scarce, Co. Dublin; Greystones, Co. Wicklow, scarce; Wexford; Waterville, Co. Kerry; Lissadell, and near Sligo, not rare (*Russ*); Portrush, Portballintrae, and Castlerock (*J.*), Co. Antrim; Magilligan, frequent (*C.*).

Agrotis simulans, *Hufn.*—A few specimens have been taken near Sligo by Mr. Russ (Ent. Record, vol. ii. 212). They are lighter in tint than Scotch examples. This insect occurring in the Isle of Man, whose lepidopterous fauna is distinctly Irish, we may expect to find it occurring elsewhere on the Irish coast.

Agrotis lucernea. *L.*—The cinereous type and the grey var. *cataleuca*, Bdv., seem not to occur in Ireland. This species is here represented by the var. *renigera*, St., a dark leaden grey insect with darker bands and paler strigæ, similar to the South Wales form (*C. G. B.*); but at Howth I have met with occasional examples of lighter grey, intermediate between the usual form and those of the South of England. It rarely seems to occur in any numbers, though it is very generally distributed on the Irish coast, usually to be taken on dangerous cliffs. An obscure blackish grey form is to be found on the extreme western headlands of Kerry, which, as it appears a local variety, I propose to call var. *kerrensis;* I have met with it on Dursey Island, and on rock islets off the Kerry coast; it is of a bluish black colour, generally almost or entirely unicolorous; but sometimes the waved transverse strigæ are slightly marked in paler tone. Localities for type:—Howth, not uncommon, and Rockabill I., off the Dublin coast; Dunmore, and Saltee I., Co. Waterford; Roche's Point, Old Head of Kinsale, and Galley Head, Co. Cork; on the Kerry coast at many localities; near Galway (*A.*); at Magilligan in one night Mr. Curzon took thirty-six; at Benevenagh Mt., Co. Derry (*W.*); Castlerock, Co. Antrim (*Bw.*); Dundrum, Co. Down, scarce (*W.*).

Noctua glareosa, *Esp.*—Very widely spread and sometimes locally (as at Howth) abundant. The whitish grey type, with reddish subterminal band, is the ordinary form. The var. *rosea*, Tutt, is not uncommon at Magilligan and Howth. I took at Kilderry, near Derry, a specimen of dull purplish grey with a darker subterminal band. Localities:—On the Dublin and Wicklow coasts; Cappagh and Dunmore, Co. Waterford; many localities in Co. Galway and Sligo; Cromlyn (*Mrs. B.*); Favour Royal, Co. Tyrone, scarce; Drumreaske, Monaghan; near Derry, fairly abundant (*C.*); Castlerock, numerous (*Bw.*); Ballycastle (*Curz.*), Co. Antrim; Black Mt., Belfast, abundant (*W.*).

Noctua augur, *Fb.*—To be met with throughout Ireland, and often not uncommon. The Irish insect is of a dark warm fuscous, and very strongly marked with the usual characters in black. It varies slightly in the ruddy tinge, but I have never met with the cold greyish fuscous variety (*hippophaes*, Hb.) so common in England.

Noctua plecta, *L.*—Similarly distributed to the preceding. I have met with very richly coloured specimens of the reddish form. One example in my cabinet may be the *unimacula* of Stdgr., the orbicular stigma being almost entirely obsolete.

Noctua c-nigrum, *L.*—Many authors, according to Mr. Tutt, consider this insect as the female form of *ditrapezium;* but as I have never met with a specimen of the latter in Ireland, it is convenient to follow the nomenclature of most English writers. This moth is decidedly scarce in Ireland, so far as my experience goes. In most localities it occasionally turns up, but usually singly, though near Derry (*C.*) and Castle Bellingham (*Thornhill*), Clonbrock (*R. E. D.*), and in some localities in the south it is not rare. Localities:—King's Co.; Sligo; Tyrone; Monaghan; Armagh; Westmeath; Dublin; Kerry; Antrim; Fermanagh.

Noctua ditrapezium, *Bkh.*—Mr. Birchall records the capture of a pair at sugar, at Kilcornan, Co. Galway, in 1857.

Noctua triangulum, *Hufn.*—Widely distributed and sometimes pretty common, but far scarcer than it usually is in England. The form appears to be the var. *intermedia*, Tutt (var. *sigma*, Haw.).

Noctua brunnea, *Fb.*—Widely distributed and often locally plentiful. It varies greatly in colour and markings. I think the purplish brown form is the most common in Ireland, referred by Mr. Tutt to var. *lucifera*, Esp. Also specimens sometimes occur of a clear brownish red, with markings and an ante-marginal band of a deeper tone, probably var. *rufa*, Tutt. There are also examples in my collection from Renvyle, Connemara; Markree Castle, Sligo; and Drumreaske, Monaghan, of a dark brown with shadings rather obsolete, except the black quadrate character between the stigmata, probably var. *nigricans*, Homeyer. Localities:—At Derry (*C.*); Belfast (*W.*); Favour Royal, Tyrone, and Drumreaske, Co. Monaghan, abundant; at Markree Castle, Sligo, Killynon and Cromlyn (*Mrs. B.*), Westmeath, Armagh (*J.*), Clonbrock, Co. Galway (*R. E. D.*), not very plentiful. I have also taken it in more or less abundance at Howth, and in the counties of Wicklow, Waterford, Kerry, &c.

Noctua festiva, *Hb.*—To be found throughout Ireland commonly. The varieties are very numerous, and grade into each other in a most perplexing manner. Forms with purplish red ground colour such as Hübner's type are very scarce. I have but a single specimen, which, however, does not conform to any described variety in that it has a red base to the wings.

Var. *congener*, Hb.—One specimen from Markree Castle, Sligo, of a dark reddish brown.

Of var. *conflua*, H. S. (following Mr. Tutt's diagnosis of the form), I have a specimen from Tyrone.

Var. *rufo-virgata*, Tutt, seems pretty common; while *mendica*, Fb., is the commonest variety of the red ochreous group.

Var. *ignicola*, H. S., is decidedly rare. I have a few specimens also of the same ground colour, but without any markings, being almost unicolorous. One of them is over one and a half inches in expanse, and has a slight indication of the subterminal band; the stigmata, which are of the ground colour, are outlined in pale, and the lower lobe of the reniform is filled with a dark shade, which is the darkest marking on the wing.

Var. *ochreo-virgata*, Tutt, sometimes occurs. I have two with a strongly marked median band, deeply elbowed in the middle to a V shape. It is a very curious aberration.

Var. *primulæ*, Esp., is very common at Howth, and elsewhere occasionally found. Often very unicolorous, except the two dark blotches on each side of the orbicular and one spot below it.

The var. *grisea*, Tutt, also occurs, but is very rare. I have two examples (from Toberdaly, King's Co., and Markree Castle, Co. Sligo) which approach Mr. Tutt's var. *cærulea*, with a lavender-suffused ground colour, the median and ante-marginal bands being well marked and ruddy. There are no quadrate markings. A strikingly handsome form.

(To be continued.)

NOTES AND OBSERVATIONS.

The late Mr. Machin's Sale.—Referring to Mr. C. A. Briggs' no doubt well-meant but somewhat testy comment on my report of the sale of Mr. Machin's Macro-Lepidoptera at Stevens's (*ante*, p. 158), it happens oddly enough that the notes on the Diurni (only) were written in collaboration with a well-known specialist of that group. Mr. Briggs has, however, invited me to make a second and more complete examination of the specimens in question. I will therefore, with the Editor's kind permission, defer my reply until I have had an opportunity of doing so.—Thos. Wm. Hall.

The O'Reilly Sale. — The sale of The O'Reilly collection at Stevens's, on the 30th of April, once again illustrates the importance, both from an economic and commercial point of view, of having all specimens properly labelled, with full data of time and place of capture. The collection under notice was a small one, and from all appearances had not been added to for several years; the specimens were in fair condition, but contained no rarities and but few varieties. The first two lots, consisting, *inter alia*, of five and six specimens of *Aporia cratægi*, fell to the writer at 6/– each. Had the collectors present been made aware of the fact that The O'Reilly bred all these specimens himself from larvæ he took in Abbots Wood some fifteen or twenty years ago, a much larger price would have been obtained. Lot 13—containing a female *Colias edusa*, with nearly spotless margins, and some nice *helice*

—realised their full value, £2 5s. Lot 6 fetched £2, and contained a very nice banded form of *Argynnis selene.* The nicest var. in the Argynnidæ, and indeed, to my mind, in the sale, was a nearly black specimen of *Melitæa athalia* from Abbots Wood. This was by no means dear at £3 5s. There were nine bred specimens of *Lælia cænosa*, all purchased by a Devonshire collector for £4 6s. Lots 46, 47, and 48 contained, *inter alia*, ten specimens of *Bryophila algæ*, said to have been taken at Brighton. I believe Dr. Sequeira acquired seven, with numerous other things, for 17/– ; and Mr. Hayward, three for 8/–. If these be genuine, it is evidently not a fact, as most of us imagined, that there are only two authenticated British specimens of this rarity, both of which are supposed to be safely located up north. Altogether the collection, with cabinet, realised some £75. Messrs. Stevens also sold, on the same day, four specimens of *Chrysophanus dispar*, all more or less imperfect, which realised £2 2s., £1 15s., £1 17s. 6d., and £1 17s. 6d.—Thos. Wm. Hall.

Mr. J. E. Robson's Sale. — The first portion of Mr. Robson's collection, consisting of the Macro-Lepidoptera (less the Geometræ), was sold at Stevens's on June 11th. At Mr. Machin's sale unusually high prices had to be noted. In this instance the limit appears to have been reached in the other direction. That the collection was rich in varieties was undeniable. The condition of the specimens was, in my opinion, quite equal to those above referred to. Unlike The O'Reilly's collection, nearly every insect bore on its individual pin a label with full particulars of locality, &c. ; and yet in very many instances good insects were sold for a quarter the price even the most moderate working entomologist would have charged for the mere setting, let alone their acquisition. As usual some vars. of the Diurni fetched good prices, notably a fine *Colias hyale* (Lot 6), suffused to the central spot and figured in Barrett and Mosley, £4 10s. A fine *Lycæna alexis*, similar to Newman's figure, went, after a smart competition, for £5 10s. A *Vanessa atalanta* var. of under side, and upper side red band on hind wings without usual black spot, also figured by Mosley, 35/–. A var. of *V. urticæ* like Newman's figure 4, £4 8s. The gem of the collection was a suffused var. of *Argynnis aglaia*, purchased on apparently an open competition for £9. Some nice local northern forms of *Melitæa artemis*, with vars. of *M. cinxia*, realised £2 15s. A very nice form of *A. paphia* with dark costal blotch only realised 20/–, a very much inferior price to what a very similar form brought a sale or two back. Against this a specimen of *Limenitis sibylla*, with partly obscured band, only fetched 6/–. 59 good specimens of *Apatura iris* (6), *L. sibylla* (7), *L. ægon*, and *Nemeobius lucina*, only 7/– the lot. Two lots of over 100 specimens of *L. corydon*, *L. adonis*, and *L. alexis*, including some pretty forms, only 6/– the lot. Three *Vanessa antiopa*, and others, 10/–. A fine picked series of *Epinephele hyperanthus* and *E. tithonus*, 6/–. A ditto of *Macroglossa bombyliformis*, *M. fuciformis*, *M. stellatarum*, and one *Chærocampa nerii*, from Dr. Hunter's collection, only 8/– the lot. Three authenticated *C. celerio*, with others, 8/–. Four *Deilephila galii* (2, Mr. Capper), and others, 8/–. *Lælia cænosa*, two pairs, 16/– a pair ; one pair not quite so good, only 5/–. The prominents and Noctuæ were, with very few exceptions, almost given away. 82 specimens of *Heterogenea asellus*, *H. testudo*, *Drepana hamula*, and others 5/–. 67 of *Notodonta carmelita*. *N. dodonea*, *N. chaonia*, &c., 6/–. 77 of *Ptilophora plumigera*, *Pygæra anachoreta* (Dr. Knaggs), and others, 4/–. 91 of *Hydræcia nictitans*, including var. *paludis*, &c., 3/–. 89 of *Xylomiges conspicillaris* (2, Mrs. Hutchinson), and other good things, 7/–. 173 specimens of *Apamea ophiogramma*, and others, 3/–. A fine series of *Noctua festiva* from some thirteen or fourteen different localities, and including most known forms, 6/–. In most cases two, in many three, and in not a few four, lots had to be offered together, ere a purchaser could be found. The reasons are not, I think, far to seek. The lotting, done, I am given to understand, by or on behalf of Mr. Robson, locally, was badly done. The specimens were all huddled together so close that their merits were not properly appreciable; the sale was badly advertised; and last, but by no means least, it was held at a wrong time of the year. A few other lots, originally belonging to the Duchess of Mantua, were sold on the same day. My worthy critic acquired, amongst a lot of rubbish, a beautiful hermaphrodite *Gonopteryx rhamni* for a very low figure. The writer, like, I believe, every one else but our sharp-eyed friend, overlooked this until too late, but he did manage to get hold of a pair of *Chrysophanus dispar* for 35/–, the female being fine and perfect.—Thos. Wm. Hall.

Tenacity of Life in the Dragonfly.—On June 2nd last I captured, near Brockenhurst, a specimen of *Platetrum depressum*, which was decapitated upon coming into contact with the net. Four or five hours afterwards I found the body, which was pinned in my collecting-box, alive and moving about. The following day an example of *Libellula quadrimaculata*, which I obtained near Lyndhurst, was served in a similar manner, and this I found quite alive two or three hours afterwards. A specimen of *Æschna cyanea*, which I caught near Bromsgrove the year before last, although minus its head, clung with tenacity to anything it was put upon for at least half an hour after the accident happened.—W. Harcourt Bath.

Note on Hepialus humuli in Orkney.—This species is out here now. There is no sign of any marking on the wings of the male as in Shetland specimens, but in some examples the head is very dark. I have noticed that the male on emerging from pupa crawls up a stem just high enough to expand and dry its wings. At the proper time it commences its pendulous flight over the spot where the empty pupa-case is lying, and rarely moves more than a few inches from that spot. When the female comes along it knocks against the male, and the pair drop together. Should a male not be visited by a female he drops down on a stem of grass, and does not renew his flight until the following night. I marked the wings of one male for observation, and found that he did not attract a partner until the third night.—H. McArthur; Hoy, Orkney, N.B., June 16th, 1895.

Colour-changes in Plusia chrysitis.—With regard to the remarks of Mr. W. D. Thornhill, *ante*, p. 159, and of Mr. W. J. Kaye, *ante*, p. 181, concerning the above, I beg to state that in the last week I have taken *with the net* nine specimens of *P. chrysitis*, all in good condition, though some are slightly rubbed by the net. Five show the green bronze and four the golden. Two I took on June 18th were very perfect, one showing green bronze and one golden.—C. Northon Bunn; Magdala House, Fremington, N. Devon, June 20th, 1895.

Queries respecting the Killing and Preservation of Insects.—For a number of years I have taken great interest in the science of Entomology in all its branches, but up to the present various causes have prevented me taking an active part therein. I am now, however, desirous of undertaking the formation of a collection, general in its character, as opportunity serves; but should first like to definitely clear up, once for all, certain doubts which exist in my mind, even after an extensive perusal of entomological literature. The extreme annoyance it is, not to mention the heavy loss, when after providing expensive cabinets, &c., for your specimens, and after taking an infinity of trouble in their collection and preservation, you sooner or later find them more or less damaged by one or other of the pests hereinafter mentioned, as well as the importance of the subject, must be my excuse for trespassing upon the space of the 'Entomologist' for the required information:—

Firstly, with regard to killing. The cyanide-bottle seems to be the mode generally recommended and in use for all orders of insects. May I ask whether this poison is quite harmless to the colours of the specimens? If not, what other method is preferable?

Secondly, as to preservation. (a) *Moulds and mildew.*—Am I right in concluding that if insects are allowed to thoroughly dry on the setting-board before being placed in the cabinet, and the last-named receptacle be kept in a dry room where there is a fire daily, except in the summer, these evils cannot occur, and hence need not be feared? (b) *Mites.*—What is really the effectual preventive? I propose obtaining a cabinet, either mahogany or oak throughout, the drawers glazed with glass tops, in frames containing the camphor-cells, and the papered cork at the bottom painted over with a solution of either chloride of mercury or corrosive sublimate in alcohol, whichever is considered to be the better. The latter solution is stated to be not only fatal to insect-life and an absolute preventive against the mite, but also a powerful preservative; the strength of the solution to be such that when a white feather is dropped into the liquid and drawn across a piece of black cloth no trace remains after evaporation. I further understand that a set-insect may itself be held by the pin and dipped sideways into the said last-mentioned solution, so that every portion of the wings and body is thoroughly wetted, and afterwards stuck on a sheet of cork, when it will dry without the slightest injury to either the colours or condition. It is averred that after this treatment "no living insect will ever touch" the specimens. May I safely adopt the above treatment with all kinds of insects, whether British or Exotic, and is the result as represented? (c) *Grease.*—Is there any absolutely certain preventive against this by immersion in any solution or otherwise, or to make sure must all large-bodied moths and butterflies be treated before the contents of the bodies become hard, as described by the Rev. Joseph Greene on pages 77 and 78 of 'The Insect Hunter's Companion'? If the latter course be necessary, how can it be carried out, or, alternatively, what is advised to be done to prevent grease in the case of Exotic moths and butterflies which have been set for some time, and the contents of whose bodies have hardened?

Thirdly and lastly, with regard to the preparation of larvæ for the cabinet. It would appear the method of inflation, after removal of the contents of the body, in the majority of instances materially alters or affects the colour and shape of the specimens. Could not the natural colours and condition be permanently preserved by merely bottling, corking-up and sealing each larva, without removing contents of body, in a glass-tube filled with turpentine or spirits of wine, after the manner recommended for spiders? If so, which of the said two spirits is the better for the purpose? and what could be used, which would not yield to the action of the liquid, to stick or fix the specimen to the side of the tube in the fashion desired?

I must apologise for troubling you at this length, but I am encouraged by the couplet on the cover of the 'Entomologist'—

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

Through which valuable medium I shall be glad to receive the aforesaid information.—J. R. Cattle; 115, King Edward Road, London, N.E., May 20th, 1895.

CAPTURES AND FIELD REPORTS.

Bombyx rubi bred.—I was successful whilst in Wales in breeding two female and one male specimen of *Bombyx rubi* out of only six larvæ obtained there last autumn. They were kept out of doors in a small box with glass front and two small apertures at the sides with perforated zinc; a piece of turf about two inches thick was placed in the bottom; the larvæ were fed on bramble, and all of them spun up this spring; but I found that two had died without turning to pupæ, and the other pupa had decayed. The first female emerged May 20th, apparently early, as I was unable to attract any males; the second emerged June 4th, and this time I was successful with three males, one of which I allowed to copulate; this was at 7.30 in the evening, and by 10 p.m. the female was depositing ova freely.—T. B. Jefferys; Bath, (late) Laugharne, Carmarthenshire, June 13th, 1895.

Deilephila livornica in Devonshire.—On June 2nd, about 8.30 p.m., my father, gathering verbena flowers in our garden near Plymouth, in Egg Buckland parish, took a fine specimen of this insect. It was so active that its thorax got somewhat badly rubbed. The locality is an inland one, being about four miles from the sea, and as I hear the species was taken a year or two ago on Dartmoor, it seems that it breeds around Plymouth.—F. J. Briggs; Exeter College, June 10th, 1895.

Collecting in North Staffordshire.—Lepidoptera appear to be out in great numbers in this county so far this season. I was collecting with my friend Mr. F. C. Woodforde, of Market Drayton, in some woods in North Staffordshire, from June 1st to 4th, when we took the following species, amongst others:—*Argynnis euphrosyne*, *Chærocampa porcellus*, one at dusk; *Nola confusalis*, abundant; *Bombyx rubi*, flying freely at sunset, when we netted several specimens; *Drepana lacertinaria* and *D. falcataria*, both taken freely by beating; *Zonosoma punctaria*, *Z. pendularia*, and *Asthena luteata*, all fairly plentiful; *Z. porata* one; *E. heparata*, one; *Acidalia remutaria*, abundant; *Macaria notata*, plentiful; *Numeria pulveraria*, several taken; *Lobophora viretata*, one only taken; *Melanthia albicillata* and *Melanippe hastata*, several of both species; *Cidaria corylata*, very abundant. At sugar, to which moths came freely, the following:—*Thyatira batis*, *Cymatophora duplaris*, *Acronycta leporina*, *A. megacephala* and *A. alni*, one specimen only of the latter; *A. rumicis*, very abundant (including the dark variety *salicis*), and *A. psi*; *Leucania comma*; *Xylophasia rurea* var. *alopecurus*, very abundant; *Dipterygia scabriuscula*, *Apamea basilinea*, *A. gemina*, *Miana strigilis*, *Grammesia trigrammica*, and *Rusina tenebrosa*, very abundant; *Noctua plecta*; *Tæniocampa gothica*, one belated specimen turned up; *Aplecta prasina*, *Hadena adusta* and *H. porphyrea*, very abundant; *H. dentina*, *H. pisi*, *H. thalassina* and *H. genistæ*; one early *Triphæna pronuba*; *Euplexia lucipara*, abundant; *Phytometra ænea* and *Euclidia glyphica* were taken in the daytime. *Aplecta tincta* and *H. dissimilis* were added to the list by Mr. Woodforde a few nights later.—E. W. H. Blagg; Cheadle, Staffs., June 18th, 1895.

Nyssia lapponaria in Scotland.—Mrs. Cross has read with interest the report on *N. lapponaria* (*ante*, p. 163). In notes made here in 1874 she finds a little sketch of a caterpillar taken (as far as she can remember) on birch. Old Thomas Eedle, who used then to be constantly at Rannoch, told her he believed it was *N. lapponaria*. She failed in breeding it, as it shrivelled up and died in the pupa state. The larva by her sketch is very like *N. hispidaria*, which she has frequently got here, but shows a rather prominent point on one of the last segments. Eedle was not often wrong in his conjectures, though at the time Mrs. Cross could hardly believe she had found the scarce *N. lapponaria*. She is glad to hear of its existence in Scotland being confirmed by Mr. Christy.—Dalchosnie, Rannoch, June 19th.

The Earlier Dragonflies. — My first capture this season was *Pyrrhosoma minium*, Har., at the Black Pond, near Esher, on May 3rd, but the species did not appear in any considerable numbers till the end of the month; its congener *P. tenellum*, Vill., was flying with it on June 9th. A few specimens of *Libellula quadrimaculata*, Linn., were out at the same place on May 8th; the species swarmed there at the beginning of June, as well as over the Basingstoke Canal near Byfleet, and at Wisley Pond near Ripley. *Enallagma cyathigerum*, Charp., was first sighted at the Black Pond on May 8th; by June 4th it had increased in numbers and brilliancy of colouring. Not a single *Agrion puella*, Linn., has fallen a victim there so far this season, whereas at Wisley Pond, on June 3rd, but one *E. cyathigerum* was taken, *A. puella* having apparently taken its place in the latter locality. A very limp specimen of *Cordulia ænea*, Linn., was captured on May 26th at the Black Pond; it was out in profusion near Byfleet on June 3rd, and in smaller numbers at Wisley Pond on the same day, and at the Black Pond on the next. On June 3rd a friend and myself secured seven specimens of *Brachytron pratense*, Müll., some near Byfleet and others at Wisley Pond, while between the two places *Calopteryx splendens*, Har., might have been taken in large numbers. *Ischnura elegans* turned up on the same day at Wisley Pond, one being also secured at the Black Pond the next day. On June 2nd a fine male *Anax formosus*, Lind., was sighted at close quarters at the Black Pond; and on the dull afternoon of the 4th three females were seen on Esher Common, two of them being easily captured. By June 9th they were well out at the Pond, but so lively were they in the bright sunshine that one could only admire them at a distance. On the last-mentioned date a single specimen of *Platycnemis pennipes*, Pall., was secured at the Black Pond, this, with *I. elegans*, being additions to my list for that locality. Of *Platetrum depressum*, Linn., about half a dozen have been sighted, of which one was captured on June 2nd near Esher.—W. J. Lucas, B.A., St. Mary's, Knight's Park, Kingston-on-Thames, June 11th, 1895.

Orgyia gonostigma.—It may be worth recording the successful emergence of the *Orgyia gonostigma* which I recorded, *ante*, p. 182. My friend and I got eight females and four males out of twelve larvæ found; he subsequently took the females out to the place where the larvæ were found, and succeeded in attracting six males, mostly in fine condition. It is a curious fact that the female larvæ of this insect undergo an extra moult, instead of the same number as the male. I have found it to be the invariable rule with *O. antiqua*, and have noticed it in some cases with *Ocneria dispar.* It would be interesting to notice whether this rule holds good with other moths whose females are much larger than the males.—H. W. Shepheard-Walwyn; Hertford College, Oxford.

Sphinx ligustri two winters in Pupa.—On June 5th ult., in the afternoon, a fine specimen of *Sphinx ligustri* emerged, after being almost two years in the pupal condition, it having turned on the last day of August, 1893. The larva was procured at Bournemouth.—Douglas B. Gloyns; 36, Market Place, Kingston-on-Thames, June 6th, 1895.

Colias edusa, &c., in Middlesex.—I am glad to be able to report the reappearance of *Colias edusa* this year. On Saturday, June 9th, I was walking along the North-Western Railway bank, about half a mile from Pinner Station, when a female flew past me, going at a great rate. This was at the identical spot where I first saw the species in 1892. About an hour later I came across a second specimen, also a female, in Oxhey Wood, which at this particular point is just in Hertfordshire. All the other spring butterflies were very plentiful, *Lycæna icarus* swarming upon the trefoil in company with *Nisoniades tages* and several *Syrichthus malvæ*, while I also saw single specimens of *Arctia villica* and *Euchelia jacobææ.* In the hayfields *Procris statices*, *Halia tenebrata*, *Euclidia mi* and *E. glyphica* have also been unusually abundant.—H. Rowland Brown; Oxhey Grove, Harrow Weald, June 9th, 1895.

Colias edusa at Reading.—On June 3rd I saw a fine male *Colias edusa* flying in a clover-field near here.—W. E. Butler; Hayling House, Reading, June 15th, 1895.

Colias edusa in Wales.—When in Carmarthenshire on June 7th I noticed a female *C. edusa* depositing ova on the bird'sfoot trefoil (*Lotus corniculatus*).—T. B. Jefferys; 17, New King Street, Bath, June 13th.

Coccyx cosmophorana, &c., in Lancashire.—From June 1st my wife and I spent eight days at Grange on health account. I was lame, and could not remain over two hours on my legs; so my wife did most of the catching, and I manipulated the boxing. My special object was to study the habit of *Butalis fusco-ænea* and, if possible, to help my friend Mr. E. R. Bankes to a clue of what the larva will be found on. So far I have found the moth creeping up out of the moss at the roots of *Helianthemum* and nothing else. The place is bare of undergrowth. I got some scores of the perfect insect; some have laid eggs, which have been sent to Mr. Bankes along with some plants. My next look-out was for *Catoptria aspidiscana*, to pin them with silver pins for my friend Thurnall; I was quite two weeks late; nearly all worn specimens. Among a miscellaneous lot of species that I boxed are *Phoxopteryx siculana, Œcophora flavifrontella, Grapholitha obtusana, Coccyx vacciniana,* and one fine large *C. cosmophorana*, the latter a very interesting catch. *Ennychia octomaculalis* was jerking about. *Nemeobius lucina* and *Argynnis euphrosyne* were enjoying themselves in the gleams of sunshine. *Lycæna astrarche* var. *salmacis* was just out and in lovely condition. I took several species in the woods far away from their usual habitat, such as *Bactra lanceolana* on dry limestone. Altogether I brought home quite a thousand specimens.—J. B. Hodgkinson.

SOCIETIES.

Entomological Society of London. — *June 5th*, 1895. — Lord Walsingham, F.R.S., Vice-President, in the chair. Dr. Sharp exhibited, on behalf of Dr. G. D. Haviland, two species of *Calotermes* from Borneo, the individuals being alive and apparently in good health; one of the two small communities (which were contained in glass tubes) consisted of a few individuals of the immature sexual forms and of a neoteinic queen; this latter had increased somewhat in size during the eight months it had been in Dr. Haviland's possession, but no eggs had been deposited, neither had any of the immature individuals developed into winged forms. The second community exhibited consisted entirely of the immature sexual forms, and this community had produced numerous winged adults while it had been in Dr. Haviland's possession. Specimens were also exhibited to illustrate the neoteinic forms that were produced in Borneo after a community had been artificially orphaned. As regards these, Dr. Sharp expressed the hope that Dr. Haviland would shortly publish the very valuable observations he had made. In the case of a species of fungus Termite, Dr. Haviland had found that the community had replaced a king and queen by normal, not by neoteinic forms. Professor Riley remarked that in many cases it would be extremely difficult to artificially orphan a nest without destroying it; he also commented on the short time in which the queen appeared to have been developed, and on the apparently rapid development of the wing pads, which usually cannot take place except after several moults; and he expressed his opinion that further information on these points was much to be desired; he corroborated the observation of Dr. Haviland with regard to the great variability in the nests of different years (or even of the same year) of the number of queens, true or neoteinic; in one nest of *Eutermes morio* he found one-fourth of the inhabitants to be true kings and queens, although not fully developed. Mr. McLachlan exhibited examples of the female of *Pyrrhosoma minium*, Harris, having the abdomen incrusted with whitish mud through ovipositing in a ditch in which the water was nearly all dried up. He had noticed the same thing in other species of Agrionidæ. Herr Jacoby exhibited four varieties of *Smerinthus tiliæ*. Mr. Enock exhibited specimens of the thistle gall-fly, *Trypeta cardui*, and also of *Caraphractus cinctus*, Haliday (= *Polynema natans*, Lubbock); with regard to the latter insect, he said that he had observed copulation to take place below the surface of the water. A discussion followed on this point, in which several of the Fellows took part. Mons. Alfred Wailly exhibited living larvæ of *Rhodia fugax*, and also a cocoon of the species, which is of a bright green colour, and differs considerably in shape from those of all the other known silk-producing Bombyces. The Secretary exhibited, on behalf of Mr. T. D. A. Cockerell, of Las Cruces, New Mexico, four species of lac-producing Coccidæ, viz., *Tachardia gemmifera*, Ckll., from Jamaica; *T. pustulata*, n. s., and *T. fulgens*, n.s., from Arizona; and *T. cornuta*, Ckll., from New Mexico. In the discussion which followed, Lord Walsingham mentioned the fact that an American species of Micro-Lepidoptera, belonging to the Œcophoridæ, feeds on the secretion deposited by one of the Coccidæ; this species, for which Dr. Clemens created a genus (the name for which was found to have been preoccupied and now stands as *Euclemensia*), is the nearest ally to the lost *Œcophora woodiella*, taken many years ago in England. Mr. Roland Trimen exhibited some specimens of "honey" ants, discovered at Estcourt, in Natal, about a year ago, by Mr. J. M. Hutchinson. The species has not been identified, but is quite different from *Myrmecocystus* and *Camponotus*—the genera which have long been distinguished as containing species some of whose workers are employed as living honey-pots for the benefit of the community. The specimens exhibited included six "globulars"—to use Mr. McCook's term in regard to the American species *Myrmecocystus hortus-deorum*—all with the abdomen enormously distended with nectar; but other examples presented to the South-African Museum by Mr. Hutchinson comprised various individuals exhibiting different gradations of distention, thus indicating that the condition of absolute repletion is arrived at gradually, and may possibly be reached by some few only of those individuals who feed, or are fed up, for the purpose. Certainly, in the nests examined by Mr. Hutchinson, in Natal, the number of "globulars" was very small in proportion to the population of ordinary workers; and it is somewhat difficult to understand of what particular value as a food reserve so very small a quantity of nectar so exceptionally stored can be. Mr. Trimen added that while the occurrence of "honey" ants in southern North America, South Australia, and he believed also in India, was well known, the Natal species now exhibited was the first African one that had come under his notice. In the course of the discussion which followed, Professor Riley said that the American species referred to by Mr. Trimen was common from Colorado to Mexico, and that the honey-bearing ants were often very numerous in their communities; he further pointed out the fact that many common species of ants have the power of distending the abdomen with honey, and that this was very evident in certain species of *Formica*. Dr. Sharp exhibited a series of Coleoptera to illustrate variation in size. This series consisted of individuals that had been kindly lent to him by M. René Oberthür, by the Hon. Walter Rothschild, by Messrs. Godman and Salvin, by Mr. Jacoby, and by Mr.

Blandford. He considers this series, and the communications he has received from the specialists to whom he has made applications, justify him in saying that great variation in size of the individual or of some of its parts is very rare in Coleoptera, and is exhibited most conspicuously by those species in which the males possess unusual structures, the use of which is unknown; such are the Brenthidæ and the genus *Rhina*, the males of which possess enormous rostrums, which are of no direct use in this sex, though the corresponding organ in the other sex is of great use, though less developed. The Lucanidæ and the horned Lamellicornia also exhibit great variation in size of the individual, more particularly in the male sex. The cases of variation in size in the great group of Chrysomelidæ were chiefly remarkable in the case of genera like *Sagra*, where the males possess unusually developed hind legs, for which we at present know of no important use. Mr. Kirkaldy exhibited specimens of *Cymatia coleoptrata*, Fab., from Morden, Surrey, an insect which had not before been recorded from the London district, and also varieties of *Notonecta glauca*, Fab.—W. W. Fowler, *Hon. Sec.*

South London Entomological and Natural History Society.—*May 23rd*, 1895.—Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Barrett, on behalf of Mr. Horne, of Aberdeen, exhibited very long series of both *Agrotis cursoria*, Bork., and *A. tritici*, L., from the N.E. coast of Scotland, showing such a range of variation that it was difficult to determine where one species ended and the other began; also a gynandrous specimen of *Saturnia carpini*, L., belonging to Dr. Mason, one side being male, the other female. Mr. Edwards, a specimen of the rare female of *Morpho cypris* from Bokota, with a male for comparison. Mr. Dennis, ova and young larvæ of *Leucophasia sinapis*, L., and of *Lycæna argiolus*, L., under the microscope. Mr. Hall, two specimens of the rare form of *Mamestra persicariæ*, L., known as var. *unicolor*, Staud., bred by a northern collector from a dark specimen derived from suburban larvæ; also several specimens of a *Eupithecia* from Mr. Machin's collection, which members thought were *E. minutata*, Gn., var. *knautiata*, Greg. Of several members who had larvæ of *Callimorpha hera*, L., most had been only very partially successful in getting them through the severe frost. A long discussion ensued as to the felling of trees in Epping Forest. The concensus of opinion was that no harm had been done, and that none was intended to be done. Mr. Carrington and others thought that a periodical cutting of the undergrowth would be of great advantage to entomologists, and instanced the method of cutting woods in Surrey and Kent.—Hy. J. Turner, *Hon. Report Sec.*

Birmingham Entomological Society.—*April 22nd*, 1895.—Mr. G. T. Bethune-Baker, President, in the chair. The following were exhibited:—By Mr. R. C. Bradley, three species of *Crabro*: *varius* and *anxius* from Wyre Forest, and one specimen of *pubescens* from Sutton; he said that only four other specimens of *pubescens* are known to Mr. Saunders from Britain. By Mr. A. H. Martineau, *Andrena angustior* (2) from Solihull, a rare species allied to *A. furcata*. By Mr. Wainwright, other Hymenoptera. By Mr. C. Runge, eggs of *Asphalia flavicornis*, as found, being laid singly in the forks of twigs. Mr.

Martineau read a paper on a collection made in his house at Solihull. He made the collection in consequence of a questioned statement that 100 species of insects enter a house in a year; he had taken 136 during the past year, and believed that if he had been able to collect more in the daytime it might have been made up to 200. The most unexpected captures were *Acidalia virgularia* and *Tinea semifulvella*, neither having been previously known locally. He noticed that *Culex annulatus* and *pipiens*, which were common in the cellars, only settled on the brickwork, never on plastered laths which covered part of the ceiling.

May 20*th*.—Mr. P. W. Abbott, Vice-President, in the chair. Exhibits:—By Mr. Abbott, a series of *Zygæna meliloti* from the New Forest, for comparison with some doubtful specimens of Mr. Wainwright's, which he believed to be only vars. of *Z. loniceræ;* also a pale specimen of *Agrotis ripæ*, bred, from Freshwater; and *A. ashworthii* from N. Wales, bred by Mr. Gregson. By Mr. R. C. Bradley, *Pompilus viaticus* from Wyre Forest, and remarked on the extraordinary activity of the family Pompilidæ, and the difficulty of capturing them. By Mr. Valentine Smith, a variety of *Rhagium bifasciatum* from Edgebaston, with the white colour much extended, making a white-looking specimen; also *Elater balteatus* (1) from Edgebaston, and three *Hister purpurascens* from New Street, in the centre of the city.

June 1*st to* 4*th*.—The fourth Annual Excursion was made to Cannock Chase, but, owing to the dulness of the weather and the very small attendance of members, nothing of importance was done, though a number of insects were secured.—Colbran J. Wainwright, *Hon. Sec.*

RECENT LITERATURE.

Abstract of Proceedings of the South London Entomological and Natural History Society for the year 1894, *together with the President's Address*. Pp. 136. May, 1895. Published at the Society's Rooms, Hibernia Chambers, London Bridge, S.E.

The earlier issue of this publication is an improvement upon which we heartily congratulate the Society from which it emanates, and whose useful work it records. The detailed reports of the meetings held during the year embrace many items of importance. Among the papers, of which there are quite a respectable number, Mr. Tutt's pleasantly written series of articles on Continental Zygænidæ deserve the attention of all interested in the group, but will hardly perhaps close the question of synonymy as regards the species discussed. These papers, together with the same writer's notes on Lepidoptera of the Alps, and papers by Mr. W. F. Warne ("A Morning's Sport near Rockhampton, Queensland, Australia") and Mr. Mansbridge ("The Rhopalocera of the Indian Territory in 1893–4") afford striking evidence of the interest taken by members of the Society in the fauna of countries other than their own. Mr. Adkin, in "Reflections upon odd Rambles on the Sussex Downs," makes some remarks on the resting habits of *Lycæna corydon*, and refers to some species which now seem to have disappeared from the neighbourhood of Eastbourne,

THE ENTOMOLOGIST

Vol. XXVIII.] AUGUST, 1895. [No. 387.

VARIETY, FORM, RACE, AND ABERRATION.

By W. Mansbridge, F.E.S.

Considering the amount of uncertainty and looseness attending the use of the above terms, a definite expression of opinion coming from some acceptable authority, and which should set the matter at rest, would be eminently satisfactory to all working entomologists. Of course every collector has his own ideas of what constitutes a variety, but it is not probable that these would coincide with the opinions of another student of similar experience. This no doubt arises from the difficulty of dealing with a subject where no sharp differences exist to separate all departures from the particular form accepted as the type of a species. Some authors think the addition or suppression of a spot, or a slightly lighter or darker tint in the ground-colour, sufficient to characterise the specimen as a variety, and proceed to endow it with a name; other writers require a greater amount of divergence, but if asked how much they probably would be at a loss for a definite explanation. And again, most of us, looking upon Entomology as a recreation or pastime with which to charm our leisure, are predisposed to treat it in a somewhat haphazard and desultory fashion that is fatal to exact knowledge.

A perusal of the views of some of the leading American entomologists, published in 'Entomological News' (vol. vi. Nos. 1—4), confirms this opinion. One writer, Rev. Geo. Hulst, giving no less than seven names, *viz.*, subspecies, race, variety, subvariety, form, variation, aberration, all being included by the term variety. The accompanying definitions show a tendency to overlap, and the use of the word "form" is restricted to "seasonal or sexual variation somewhat permanent." The majority of the authors use this term in the same sense, Prof. Packard alone employing it as British entomologists do, in a general manner, practically synonymous with "variety."

"Variety" is consistently employed as a general term, and "aberration" designates an unusual and rarely occurring variety, erratic in its appearance, and with little or no tendency to transmit its peculiarities to offspring; although this point may not have been thoroughly investigated in America, as we know, from the results of pedigree-breeding, that this kind of variety can be produced in increasing numbers with every successive brood.

"Race" is used in its usual sense to designate a particular variety or form which is restricted to a particular and perhaps isolated locality, and which has been established, by breeding, to belong to a particular species.

Taking a general view of the opinions expressed, it is more than anything else a question of degree, with the single exception of the American specialized use of the word "form," which seems more properly used in its general sense; thus it should not be difficult to frame a more satisfactory set of definitions than have hitherto been advanced.

NOTES ON THE YELLOW AND OTHER VARIETIES OF *ZYGÆNA TRIFOLII.*

By W. M. Christy, F.E.S.

The following notes relate to a particular colony of *Z. trifolii* which I only discovered in 1893, although I had been living near it for years. In the year mentioned the species was excessively abundant, but small in size; I fear it will never be so plentiful again. I took about a hundred specimens of the yellow variety, all told. In 1894 the colony was very weak, and I only found two yellow specimens among them. This year (1895) the species was fairly numerous, and I was able to get sixteen yellow specimens. In 1893 I removed a lot of the red form to another spot where *Z. trifolii* did occur before, and in the following year I was rewarded by finding there two yellow specimens, which brought up my total for 1894 to four examples of the yellow variety.

Now, as to breeding the yellow variety: two of the specimens taken last year laid a lot of eggs, and from these I have raised over 200 moths. Not one of these is of the yellow form, but all are of the ordinary crimson-red colour. On the other hand, Mr. Fletcher, of Worthing, reared seven yellow examples, I believe, from eggs which I sent him in 1893.

There is no variation in the shade of colour of the yellow form; at least this is so with one exception. I have one yellow example which is tinged or shaded with pinkish, In another variety which I have noticed in this colony the colour is orange-red or brick-red. This form, unlike the yellow one, does vary in the shade of colour: some of them are almost of the normal crimson-red, whilst others are very decidedly distinct in colour from the ordinary form.

Another variation is one that reminds me very much of *Zygæna pilosellæ?*—the Irish burnet. The red colour occupies the greater part of the fore wings, and the blotch is specially wide towards the hind margin, where it shades off imperceptibly into the green margin. The wing-rays appear greenish, running into the red blotch from the hind margin; this gives the red blotch an undefined and feathery edge. I have taken two of these at this colony, and another, years ago, at another place near by. This remarkable colony also produces a few specimens imperfectly provided with wings, some even without wings at all. I have one specimen which has one well-developed hind wing, but the other three wings are entirely absent. Another example bears two good wings on one side and a rather bleached and imperfect hind wing only on the other.

Most curious of all, perhaps, are specimens with their wings considerably shortened or cropped off, the hind or outer parts being left with deep wedge-shaped notches cut out of them.

Some bred specimens with dwarfed wings ought perhaps also to be mentioned; two of these have full-sized bodies, but the wings are only half their proper length. Yet these wings show all the spots clearly, but in miniature and rather crowded.

Watergate, Emsworth.

WHY NOT COLLECT TORTRICINA?

During the past twenty years or so there has certainly been some increase in the number of micro-lepidopterists, and the results have been the discovery of many new species, together with a considerable addition to our knowledge of the group as a whole; but much still remains to be done. For several species of Tortricina, for example, only a few British localities (sometimes only a single one) have been recorded; but most probably, if there were a greater number of collectors of this family, it would be found that such species were more widely distributed. The life-histories of certain species in the same family have yet to be made known, and the much-vexed question of species *versus* variety has yet to be decided in not a few cases.

There is no doubt that if collectors of British Lepidoptera were more generally interested in Tortricina than they appear to be, they would have fewer barren excursions than often falls to their lot. All the species are very interesting, and many are exceedingly pretty. They are easily collected, mostly by day, either as imagines or larvæ. In the latter stage they are, with a few exceptions, not difficult to rear, and the moths can be set with less trouble than many species of Macro-Lepidoptera. The task of identifying some of the more obscure species is sometimes rather perplexing perhaps, but certainly should not deter one from making a collection of Tortrices. The concise descriptions in the second volume of Stainton's 'Manual' are excellent, and should enable the beginner to determine the majority of his captures without any serious difficulty. In cases where he finds himself puzzled he may always rely on the help of those who are better acquainted with the group. He must, however, endeavour to work out the species for himself as far as possible, as the more practice he has in this kind of thing the more readily will he be able to determine his captures. A good plan to facilitate the work of identification would be to obtain types of all the more or less common species; but of course it would be necessary to have only specimens in fine condition, and equally of course there should be no doubt about these being correctly named.

Although the volume of Stainton referred to admirably serves as an introduction to the study of our Tortricina, it is unquestionable that a new work on the subject is much needed. A large amount of information concerning the family has been published during the past thirty or forty years; but this is to a large extent scattered through many volumes, and awaits collation by a specialist to render it of practical use to the student. Figures of the species would be desirable; but these, to be of any value for identification, need to be produced in the best possible manner, which of course would mean at considerable cost; consequently a good illustrated work would be beyond the means of most of those to whom such a work would be of the greatest service, even if anyone should feel disposed to incur the heavy expense of bringing it out.

Richard South.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 202.)

Noctua dahlii, *Hb.*—Very widely spread but local, and occasionally very numerous. The pale ochreous brown form taken in England, much mottled and with distinctly marked band and strigæ, I have not seen in Ireland. A Scandinavian specimen, sent me as a type by Sven Lampa, of Stockholm, is of a very faded ochreous colour, much mottled and faintly banded. I have, however, met with a few mottled Irish examples, but with either a pale reddish fuscous, or a brownish red ground colour. In Ireland it is a distinctly darker insect than the generality of English specimens (as I understand it is also in Scotland); generally of a purplish red, with suffused median band, and the strigæ and orbicular stigma more or less obsolete, but the reniform clearly marked. It often very nearly approaches dark forms of *N. brunnea.* A rarer form also occurs, of a unicolorous dark sepia colour, the only marking being a very clear whitish reniform stigma, preceded by a darker blotch representing a vestige of the median band, and in some instances a pale dotted ante-marginal waved line. Some examples of this melanic variety are wholly unicolorous, while others show only a trace of the pale reniform, and others only with its outline represented. I propose to name this dark form var. *perfusca.* It is not scarce about Favour Royal, Tyrone; and I have met with it at Markree Castle, Sligo; and in Lord Crofton's demesne near Roscommon; and at Clonbrock, Co. Galway, where also occur very mottled specimens. Localities:—Howth and Killarney (*B.*); Buncrana; "common at Magilligan, and on the shores of L. Swilly" (*C.*); very dark forms at Carrablagh (*G. V. H.*), Co. Donegal; Lissadel and Markree, not scarce, Co. Sligo; Ardrahan, Co. Galway; Saltee I., off the Wexford coast.

NOCTUA RUBI, *View.*—Plentiful where it occurs, but restricted in distribution. The red form (*quadratum*, Hb.) is said (*cf.* 'British Noctuæ,' Tutt) to be a seasonal dimorphism. I certainly have taken this variety alone at Farnham, Cavan, and elsewhere, and thought it to be a local race; but my notes are defective as to autumn and summer captures. Common at Belfast (*W.*); and Drumreaske, Co. Monaghan; Favour Royal, Co. Tyrone; Farnham, Cavan; Tempo, near Enniskillen (*Langham*). Scarce at Enniskillen (*Col. Partridge*) and Armagh (*J.*); common at Castle Bellingham, Co. Louth (*Thornhill*) and Howth; also occurs at Markree Castle, Sligo; Dalyston and Clonbrock, Co. Galway; and Kilcool, Co. Wicklow.

NOCTUA UMBROSA, *Hb.*—Widely distributed and pretty common.

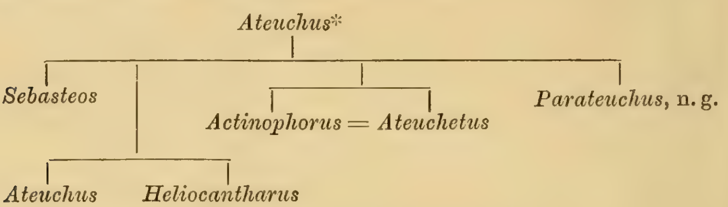
NOCTUA BAIA.—Very generally distributed, and occurring in more or less abundance in most localities, but scarcer than *umbrosa.* The colour varies somewhat, from a rich ferruginous brown to a greyer tone.

(To be continued.)

A REVISED CLASSIFICATION OF THE GENUS *ATEUCHUS*, WEBER.

By John W. Shipp.

In my list of species belonging to the genus *Ateuchus* I refrained from using the various subgenera, as the different authors did not characterize their genera sufficiently; and the whole of the subgenera were in a state of confusion, so that they could not easily be arranged. I have since, however, been able to rearrange and modify these characters so that the several groups may be easily determined as follows:—



I. Clypeus furnished with two or three deflexed teeth on the under side; anterior portions of the lateral margins of thorax sinuated; apex of anterior tibiæ curved inwards, 4-dentate on outside edge; a medial tooth on inner edge, two teeth on longitudinal carina on the upper side. Head produced in front . . . . *Sebasteos*, Westw.

II. Clypeus simple on the under side; anterior portion of lateral margins of thorax hardly if at all sinuated; anterior tibiæ 4-dentate, not curved at apex, simple on upper side. Head not so produced in front.

  A. Sides of elytra parallel or subparallel; abdomen not cordiform; extreme apices of the four posterior tibiæ produced into a long inarticulate spur, and not truncated.

    i. Elytra parallel-sided; pygidium invariably twice as broad as long; lateral margins of thorax produced into an obtuse point towards the centre nearer the posterior angles; inner margin of anterior tibiæ slightly sinuated, without teeth . . *Ateuchus*, Weber.

    ii. Elytra subparallel; lateral margins of thorax rounded, not produced to an obtuse point near centre; inner margin of anterior tibiæ sinuated, and with two small teeth in centre . . . . . *Heliocantharus*, McLeay.

---

[*] See 'Entomologist,' xxviii. p. 40.

B. Elytra attenuated towards apex; intermediate tibiæ furnished with an articulated spur at apex; the four posterior tibiæ are truncated at apex; body more or less cordiform; lateral margins of elytra with a strong reflexed longitudinal carina or ridge.
  i. Abdomen strongly cordate, with the apex obtuse, greatly attenuated towards apex, more convex; thorax more convex, transversely compressed, giving it a more truncated appearance in front; head not perceptibly elongated . . . *Actinophorus*, Creutz.
  ii. Abdomen very slightly cordate, very slightly if at all convex; thorax simple, slightly convex; head perceptibly elongated in front; anterior tibiæ very much elongated, straight, 4-dentate; hind tarsi verticillated; body flattened; legs very hairy . *Parateuchus*, Shipp.

SEBASTEOS, *Westw.*

Trans. Ent. Soc. iv. 1842, p. 2.

Head distinctly elongated, free, and dilated at sides; clypeus with three deflexed teeth on the under side, one at the apex of the central indentation on the under side, and one at each of the apices of the two centre teeth; fore tibiæ with a centre spur on the inner margin, curved inwards at apex; four hind tibiæ slightly truncated, with a long curved spur springing from the inner margin; a very large and deep cicatrice on each side of the lateral margins of the thorax, just above the centres; the anterior angles terminated in two small obtuse teeth; hind tarsi pyriform, jointed; apical margin of the mentum curved, not sinuated as in *Ateuchus*.

galenus, Westw. (type), Trans. Ent. Soc. iv. 1842, p. 2, pl. xvii. f. 1 and det.; Shipp, Ent. xxvii. p. 291, 1894 (synonymy).
Central Africa.
poggei, Waterh., Ann. Nat. Hist. (6), v. p. 367 (1890).
Congo.
rostratus, Pering., Tr. Sth. Afr. Phil. Soc. iv. p. 92.
South Africa.
westwoodi, Har., Col. Hefte v. (1869), p. 95.
South-west Africa.

Prof. Westwood described this genus in 1842 with *galenus* (a new species) as his type. Bohemann (Ins. Caffr. ii. 1857) uses the name to denote *rusticus*, *funebris*, *cicicatricosus* (*bohemanni*, Har.); whilst *paradoxus* (*galenus*, Westw.) is placed by him in a subgenus *Actinophorus*. Erichson, evidently not comprehending the generic characters, places *intricatus*, *morbillosus*, and *laicus* as belonging to it.

I believe that *poggei*, Waterh., is identical with *S. westwoodi*, Har.

ATEUCHUS, *Weber*.
Obs. Ent. p. 10 (1807).
=*Scarabœus*, Linn., Har., Panz., Muls., &c.

Abdomen with the sides of the body parallel, not at all contracted behind, but shortly truncated; lateral sides of thorax produced to an obtuse point in the middle nearer the posterior angles. Thorax not very convex, but slightly rounded towards disc. Head with two lateral carinæ extending from the inner margin of the eyes towards the clypeus; four hind tibiæ long and slightly sinuate, not distinctly truncate; tibial spur longer than the three basal joints of tarsi in the four posterior tibiæ; sutural ridges distinctly visible. Head not perceptibly elongated. The four posterior tibiæ are produced into a long *inarticulated* spur; the apical spur on anterior tibiæ is very short and almost obsolete.

*ægyptiorum** (p. type), Latr., Voy. Cailliaud, iv. p. 279, t. 58, f. 10 (1827).
sanctus, Fb., Ent. Syst. Suppl. p. 34; Syst. El. i. p. 56.
erichsoni, Har., Col. Hefte ii. p. 94 (1867).
cribricollis, Waterh., Proc. Zool. Soc. (1885), p. 231, pl. xv. f. i.
venerabilis, Har., Col. Hefte viii. p. 2.

HELIOCANTHARUS, *McLeay*.
Horæ Ent. ii. p. 497.

Head not so produced; clypeus 6-dentate. Body with the sides subparallel, wider across the centre, truncate at apex. Thorax rounded at the lateral margins; posterior angles rounded, almost obsolete; posterior margin produced to an obtuse point at the suture; anterior angles rounded; apex of the pygidium bent underneath; the abdomen not truncated; sutural ridges distinct; hind tibiæ not spined or toothed.

sacer (type), Linn., Syst. Nat. i. pt. 2, p. 545.
pius, Illiger, Mag. ii. p. 202.

ACTINOPHORUS, *Creutz*.
Ent. Vers. (1799), p. 79.
Ateuchetus, Bedel, L'Abeille.

Four posterior tibiæ truncated at tips, the posterior pair having a single spur; intermediate tibiæ with a single inarticulated spur; hind tibiæ produced into an inarticulated spur, and the extremities distinctly but obliquely truncated. Sides of abdomen attenuated towards the apex; sides of thorax rounded, not produced into a point in the centre; hind tibiæ comparatively short, not sinuated. Apical spurs of the four posterior tibiæ short, barely exceeding in length the fourth or basal joint of the tarsi; femora produced into a dilated tooth in the centre in the males of some species. No visible sutural ridges. Head not distinctly elongated.

---

* For synonymy see Entom. xxvii. p. 289–93.

puncticollis (type), Latr., Mem. Mus. Hist. Nat. v. p. 7, t. 18.
laticollis, Linn., Syst. Nat. 2, p. 549, 38.
variolosus, Fb., Mant. Ins. i. p. 16.
semipunctatus, Fb., Ent. Syst. i. 63, 207.

PARATEUCHUS, g. nov.

Body flatter than any of the preceding, hardly convex, flat on disc. Thorax wider than abdomen; sides subparallel, rather narrower towards apex. Pygidium small, curving inwards at apex. Clypeus produced in front, 6-dentate; teeth regular and pointed. Lateral margins of thorax rounded; posterior margin rounded. Prosternal keel produced to an obtuse point. Anterior tibiæ long, slightly curving inwards at tips; teeth regular and similar; terminal spine rather short and sharp. Hind legs long and slender; tarsi very elongated.

morbillosus (type), Fabr., Ent. Syst. i. p. 63; Syst. El. i. p. 56.
Guinea; Gambia.

ONTHOPHAGUS: CORRECTION IN NOMENCLATURE.

By John W. Shipp.

ONTHOPHAGUS, *Latr.*

Biplagiatus, Thomson, Archives, Entom. xi. p. 54, 1858.
Peringueyi, Shipp.
    =*biplagiatus*, Peringuey, Trans. S. Afr. Phil. Soc. iv. pt. 11, p. 99, 1886.

Peringueyi, Shipp (*biplagiatus*, Peringuey, nec Thomson).

Head broader than long, punctured, with a short transverse ridge in the centre, and another on the clypeus, a little more raised than the first, and reaching nearly from one eye to the other; clypeus produced in front, with well-defined recurved margin, rounded apically and with a small indent in the centre, deeply punctured, and with the head shortly pubescent. Prothorax retuse anteriorly, broader than long, deeply punctured on the anterior part only, shining black, marginated with a moderately deep fovea on each side, convex posteriorly, and with a somewhat deep excavation in the middle of the anterior part, with the upper sides of the excavation produced in a short smooth acute protuberance. Elytra once and a half as long as the prothorax and contiguous to its base, with the sides very little ampliated, moderately depressed, finely striated, with the striæ punctured; shining black, with a slightly sinuated posteriorly basal yellow patch on each elytron, reaching from the 1st stria to the 4th, and extending to the median part of the elytra. Pygidium triangular and very convex, and deeply punctured. Under side black, shining; legs somewhat reddish; tarsi fuscous. Long. corp. 9 mm., lat. 4½ mm.

Hab. Beaufort, West, Cape Colony.

Biplagiatus, Thoms.

Head and thorax brilliant green bronze. Elytra of a yellowish testaceous, with a large common lateral black spot. Ventral surface and tarsi of a very brilliant dark brown bronze. Head rounded and raised on the anterior extremity, rather thickly punctured. Two blackish parallel carina are situated on the anterior extremity, between the eyes. Prothorax pubescent, very strongly punctured, feebler on the disc. Elytra pubescent, regularly striated. Long. corp. 5 mm., lat. 3 mm.

Hab. Gabon, Afr.

Oxford, 1895.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By Arthur G. Butler, Ph.D., F.L.S., &c.

(Continued from p. 125.)

Remigia megas.

Remigia megas, Guenée, Noct. 3, p. 317, n. 1776 (1852).
R. marcida, Guenée, *l. c.*, n. 1777 (1852).
Phurys perlata, Walker, Lep. Het. xiv. p. 1489, n. 3 (1857).
Remigia remanens, Walker, *l. c.*, p. 1498, n. 8 (1857).
R. hexastylus, Harvey (see Grote's Check-List, p. 41, n. 1277).

North America to West Indies. In Coll. B. M.

Cænurgia, *Walk.*

Litosea, Grote.

Cænurgia convalescens.

Drasteria convalescens, Guenée, Noct. 3, p. 289, n. 1734, pl. 22, fig. 9 (1852).
Cænurgia socors, Walker, Lep. Het. xiv. p. 1492, n. 1 (1857).
C. purgata, Walker, *l. c.*, n. 2 (1857).

New York, E. Florida, and Canada. In Coll. B. M.

Cænurgia togataria.

Anaitis ? togataria, Walker, Lep. Het. xxv. p. 1445, n. 12 (1862).
Litosea adversa, Grote (see Check-List, p. 39, n. 1108).

Mexico and California. Types in Coll. B. M.

Euclidia runica, Felder, belongs to this genus, and I am inclined to think that *Euclidia intercalaria*, Grote (of which, however, I only know the female), should also be placed here.

Siavana, *Walk.*

Harveya, Grote.

Siavana repanda.

Siavana repanda, Walker, Lep. Het. xiii. p. 1009, n. 1 (1857).
Harveya auripennis, Grote (see Check-List, p. 41, n. 1269).
United States. In Coll. B. M.

It is extraordinary that Grote and Robinson could have gone carefully through the Museum collection without noticing our seven examples of this very conspicuous species.

Panopoda, *Guen.*

The named forms of this genus are much confused. The *P. rubricosta* of Guenée is a variety of *P. rufimargo*, in which the lower part of the reniform marking of primaries is filled in with black ("in the form of a tear," Guenée says).

P. roseicosta is a combination, the male being evidently an ochreous variety of the form generally recognized as *P. carneicosta*, whereas the female is *P. rufimargo*; the name *P. roseicosta* will, therefore, supersede that of *P. carneicosta*. There can be no doubt on the point, for Guenée distinctly says that the reniform spot is like a 2, and (by implication) describes it as black; whereas the reniform spot of *P. carneicosta* is said to be in the form of an L, and is a variety of the other.

P. cressonii, Grote, Proc. Ent. Soc. Phil. 1863, vol. i. p. 346, pl. 3, fig. 4, is a grey variety of *P. rufimargo*, but I do not see it at p. 41 of the Check-List for 1882.

In my opinion the whole of the named forms are sports of *P. rufimargo*.

As synonyms of the above varieties, the following, described by Walker, may be noted:—*Ophiusa combinata*, Walk. (Lep. Het. xiv. p. 1436, n. 37), = *P. carneicosta* and *Poaphila scissa*, Walk. (Lep. Het. Suppl. 3, p. 987), = *P. roseicosta* (grey variety).

The varieties of this species may therefore be tabulated as follows:—

a. Reniform spot pale yellow.	
1. Wings above ochreous.	*P. rufimargo.*
2. ,, ,, grey.	*P. cressonii.*
b. Reniform spot with lower half black.	
1. Wings above ochreous.	*P. rubricosta.*
c. Reniform spot black.	
1. Reniform spot L-shaped; wings grey.	*P. carneicosta.*
2. Reniform spot 2-shaped; wings ochreous.	*P. roseicosta.*
3. Reniform spot 2-shaped; wings grey.	*P. scissa*

The above differences are practically all the distinctive characters between these sports, the form of the transverse lines being variable.

EPIDROMIA, *Guen.*

Epidromia pannosa.

Epidromia pannosa, Guenée, Noct. 3, p. 326, n. 1791 (1852).

Remigia saturatior, Walker, Lep. Het. xiv. p. 1502, n. 12 (1857).

Brazil. In Coll. B. M.

Epidromia valida.

Ophisma valida, Walker, Lep. Het. Suppl. 3, p. 953 (1865).

St. Domingo. In Coll. B. M.

Epidromia zetophora.

Epidromia zetophora, Guenée, Noct. 3, p. 326, n. 1792, pl. 23, fig. 5 (1852).

Ophisma ? antica, Walker, Lep. Het. Suppl. 3, p. 954 (1865).

Venezuela. In Coll. B. M.

M. Guenée's figure of this species is very bad; more like a *Thermesia* than an *Epidromia* in form.

ORTHOGRAMMA, *Guen.*

Orthogramma coppeyi.

♂ *Orthogramma coppeyi*, Guenée, Noct. 3, p. 348, n. 1816 (1852).

Epitausa lætabilis, Walker, Lep. Het. x. p. 477, n. 1 (1856).

♀ *Thermesia ? icterodes*, Felder, Reise der Nov. Lep. 4, pl. cxviii. fig. 7.

St. Domingo. In Coll. B. M.

Orthogramma guttularis.

♀ *Thermesia guttularis*, Walker, Lep. Het. Suppl. 3, p. 1049 (1865).

Azeta apicifera, Walker, *l. c.*, p. 1065 (1865).

♂ *Archana certa*, Walker, *l. c.*, p. 1098 (1865).

Ega, Santarem, Pará, Espiritu Sancto. In Coll. B. M.

ARGIDIA, *Guen.*

Argidia tomyris.

Phalæna tomyris, Cramer, Pap Exot. 3, p. 123, pl. 262, F, G (1782).

Argidia hyperythra, Guenée, Noct. 3, p. 346, n. 1813 (1852).

Surinam and Cayenne.

There cannot be a question about the identity of these supposed species; even Guenée is obliged to admit that his

A. hyperythra "only differs in the two black patches on the lower wings, if the figure of Cramer is exact," as if it were not patent to anyone who examines Cramer's figures, that they are little more than rough maps of the species which they represent; besides, the absence or presence of black patches (even if they were not grease spots) would not constitute Cramer's insect a distinct species, but only a different individual.

Hypenaria subvelata, Walker, and the allied *Argidia aganippe*, Felder, come near to *A. tomyris*, but are altogether greyer above and yellower below; both are represented in the Museum collection by female examples. On the upper surface the resemblance of *A. aganippe* to *subvelata* is considerable, but the under surface separates them at once.

Argidia tarchon.

♀ *Phalæna tarchon*, Cramer, Pap. Exot. 2, p. 65, pl. 139, c (1779).

Azirista intracta, Walker, Lep. Het. xv. p. 1639, n. 1 (1858).

♂ *Argidia subrubra*, Felder, Reise der Nov. Lep. 4, pl. cxviii. fig. 28.

Santarem and Rio Purus. In B. M.

I believe it is this species which Cramer re-figures as *P. wedelina* (pl. 397, M.); it is certainly not the species represented by Felder, which is a badly coloured, though well drawn, figure of *A. subvelata*, Walk.

Argidia suffusa.

Thermesia suffusa, Walker, Lep. Het. xv. p. 1561, n. 2 (1858).

T. tinctifera, Walker, *l. c.*, p. 1570, n. 18 (1858).

St. Domingo and Honduras. Types in Coll. B. M.

AZAZIA, *Walk.*

This genus differs from *Thermesia* in the shorter third joint of the palpi.

Azazia rubricans.

Ophiusa rubricans, Boisduval, Faune Ent. Madag. p. 106, n. 11, pl. 16, fig. 1 (1833).

Thermesia transducta, Walker, Lep. Het. Suppl. 3, p. 1058 (1865).

Asia, Africa, and Pacific Islands. In Coll. B. M.

THERMESIA, *Hübn.*

Thermesia gemmatalis.

Thermesia gemmatalis, Hübner, Exot. Schmett. Zutr. figs. 153, 154.

T. monstratura, Walker, Lep. Het. xv. p. 1564, n. 7 (1858).

T. costalis, Walker, *l. c.*, p. 1570, n. 17 (1858).

Hypernaria (sic) *detrahens*, Walker, *l. c.*, p. 1622, n. 21 (1858).
Plaxia subducta, Walker, *l. c.*, p. 1624, n. 1 (1858).
P. spiloleuca, Walker, *l. c.*, n. 2 (1858).
Remigia subsignata, Walker, *l. c.*, p. 1846 (1858).
Thermesia acutilinea, Walker, *l. c.*, Suppl. 3, p. 1045 (1865).
Hypernaria (sic) *anisospila*, Walker, Char. Undescr. Lep. p. 58, n. 96 (1869).

New World generally. In Coll. B. M.

We have an immense series of this very variable species, so that there is no doubt whatever as to the identity of the named sports recorded in the above synonymy. The genus *Thermesia* appears to be a small one, members of at least half a dozen genera having hitherto been wrongly referred to it.

Epistis, *Hübner*.

Hypenaria, Guenée.

This genus is actually nearly allied to *Thermesia*, but differs in having a little tuft or fringe on the upper surface at the distal extremity of the third palpal joint, which gives it an obliquely truncated or sometimes a notched appearance; the antennæ of the males also are pectinated and ciliated. Owing to the slender character of the abdomen in the females, several of them have been described as males.

Apistis fellearis.

♀ *Apistis fellearis*, Hübner, Exot. Schmett. Zutr. figs. 379, 380.
Hypernaria (sic) *metastigma*, Walker, Lep. Het. xv. p. 1621, n. 19 (1858).
Hypenaria mucescens, Felder, Reise der Nov. Lep. 4, pl. cxix. fig. 31.

♂ Trinidad, ♀ Venezuela. In Coll. B. M.

Apistis guttiluna.

♂ *Ctypansa guttiluna*, Walker, Lep. Het. Suppl. 3, p. 1078 (1865).
♀ *Hypernaria* (sic) *basigera* ♂, Walker, *l. c.*, p. 1080 (1865).

Santarem. Types in Coll. B. M.

Apistis exponens.

♂ *Hypernaria* (sic) *exponens*, Walker, Lep. Het. xv. p. 1621, n. 18 (1858).
♀ *H. hilaris* ♂, Walker, *l. c.*, Suppl. 3, p. 1083 (1865).
♂ *Hypenaria triocellata*, Butler, Trans. Ent. Soc. 1879, p. 74, n. 139.

Pará, Ega, and Rio Jutahi. Types in Coll. B. M.

Apistis eulalia.

♂ *Phalæna eulalia*, Stoll, Suppl. Cramer, pl. xii. fig. 2.

♀ *Hypernaria* (sic) *tenebrifica* ♂, Walker, Lep. Het. Suppl. 3, p. 1084 (1865).

♂ *H. basisignata*, Walker, Char. Undescr. Lep. p. 57, n. 95 (1869).

Espiritu Sancto and Pará. In Coll. B. M.

Apistis chermesipila.

♂ *Hypenaria chermesipila*, Guenée, Noct. 3, p. 383, n. 1874 (1852).

♀ *Hypernaria* (sic) *concordans*, Walker, Lep. Het. xv. p. 1619, n. 15 (1858).

Venezuela. In Coll. B. M.

Apistis binocula.

♀ *Hypænaria binocula*, Guenée, Noct. 3, p. 384, n. 1877 (1852).

♀ *Hypernaria* (sic) *rubripalpis* ♂, Walker, Lep. Het. Suppl. 3, p. 1080 (1865).

♀ *H. rudis* ♂, Walker, *l. c.*, p. 1081 (1865).

Ega and Santarem. In Coll. B. M.

It will be seen in the above synonymy of this genus, Walker invariably mistook females for males, the different structure of the frenulum in the sexes being evidently unknown to him.

Apistis angusta.

♂ *Phalæna angusta*, Cramer, Pap. Exot. 4, pl. 397, fig. F (1782).

♀ *Hypernaria* (sic) *unanimis*, Walker, Lep. Het. xv. p. 1613, n. 1 (1858).

Mexico. In Coll. B. M.

THIONA, *Guen.*

Thiona? obliterans.

Plaxia obliterans, Walker, Lep. Het. xv. p. 1627, n. 6 (1858).

Thermesia ignilinea, Walker, *l. c.*, Suppl. 3, p. 1046 (1865).

Ega and Rio Negro. Types in Coll. B. M.

Plaxia atriplaga of Walker appears to be a *Thermesia*. It differs slightly from *T. gemmatalis* in the form of its primaries, but otherwise I have not discovered any structural difference, whilst the pattern is very similar.

(To be continued.)

NOTES AND OBSERVATIONS.

Tenacity of Life in Insects.—Your correspondent Mr. Harcourt Bath's note on decapitated dragonflies (*ante*, p. 204) reminds me that after the loss of a head or still greater injury some insects will not only retain their vitality for a considerable time, but will even perform functions. In 1828 Messrs. Kirby and Spence wrote:—"Yet a crane-fly (*Tipula*) will leave half its legs in the hands of an unlucky boy who has endeavoured to catch it, and will fly here and there with as much agility and unconcern as if nothing had happened to it [they might have added that the disunited legs themselves would exhibit movements for an appreciable time]; and an insect impaled upon a pin will often devour its prey with as much avidity as when at liberty. Were a giant eviscerated, his body divided in the middle, or his head cut off, it would be all over with him; he would move no more; he would be dead to the calls of hunger; or the emotions of fear, anger, or love. Not so our insects. I have seen the common cockchafer walk about with apparent indifference after some bird had nearly emptied its body of its viscera; a humble-bee will eat honey with greediness though deprived of its abdomen; and I myself saw an ant, which had been brought out of the nest by its comrades, walk when deprived of its head. The head of a wasp will attempt to bite after it is separated from the rest of the body; and the abdomen under similar circumstances, if the fingers be moved to it, will attempt to sting. And what is more extraordinary, the headless trunk of a male *Mantis* has been known to unite itself to the other sex. These facts, out of hundreds that might be adduced," &c., &c. Corroborating the last statement, though the mutilation was in all probability subsequent to the act, I have myself recorded ('Weekly Intell.' 1862, p. 180) the fact that the living abdomen (writhing) and hind wings (flapping) of *Tapinostola bondii* (female) were seen *in copulâ* with a male of that species by my friends McLachlan and J. W. Downing, and also by myself. The Rev. Mr. Bird long ago, in the 'Entomological Magazine,' wrote thus:—"When I was young in Entomology, I wished anxiously to find the quickest mode of killing an insect. Having captured a pretty beetle (*Malachius æneus*) it struck me that by cutting it in two at the junction of the thorax and abdomen I should kill it in a moment. I took a pair of scissors and divided it; the parts fell on a piece of white paper which lay before me. Far from being dead in an instant, I was grieved and surprised to see the head, with the fore legs attached to it, begin to run about the paper. It occasionally stumbled, but rose again, and exhibited, if I may so speak, perfect self-possession. It made for the edge of the paper, but, arriving there and looking over it, seemed to think it too precipitous, and so coasted along in quest of an easier descent, which nevertheless it did not seem able to find. This coasting and searching for a convenient place of descent, suited to its curtailed condition with respect to legs, of which it appeared perfectly aware, occupied the head incessantly. I regarded it with astonishment. Here then, I said to myself as I watched its motions, here lies the vitality of the insect; the body at any rate is dead. But in this I was quickly undeceived, for in about a minute after the body had fallen upon the paper I saw the hind legs brought upward, and employed in deliberately brushing and cleaning the wing-cases, exactly as a house-fly may be seen to clean its wings on a window-pane. The legs were then withdrawn, and the cases raised up, the true wings expanded from beneath, and all made ready for flight, which indeed I expected to see; but, the body seeming then to become aware that there was no guide, the head, its former companion, being in possession of the eyes, the design was abandoned, the wings folded up in their usual beautiful manner, and the attitude of rest again resumed. This whole process was repeated with perfect regularity at intervals of about a minute, if I rightly remember. A more perfect act of a sentient creature could not be exhibited. The head continued to run about, and the body to clean and expand its wings, the one for about twelve, the other for sixteen hours." . . . This grim curiosity is endorsed and quoted by Professor Westwood in his 'Text-book' (1838). I have a vivid recollection of an unusually fine female *Aglossa pinguinalis*, which had been long enough on the saddle to have its wings, thorax, and thoracic end of abdomen sufficiently set (and presumably dead) to have been placed in the cabinet, but which nevertheless showed unmistakable signs of vitality about the ovipositor end, from which eggs were still being protruded. And this opens up another question, the discussion of which may be deferred to a future opportunity.—H. Guard Knaggs; London, N.W., June 29th, 1895.

"Jumping Beans."—It seems that there is no need to go to South Africa for a "jumping bean." The cocoon of one of our own ichneumon-flies will jump very respectably, for a time at any rate. The ichneumon that I mean is one that infests *Tæniocampa gracilis.* Having killed its host it makes an egg-shaped or rather a perfectly oval cocoon, soft and white at first, but becoming hard and brown afterwards, and about three-sixteenths of an inch long. If these are put upon a hard surface they will jump nearly one inch in height. A dozen or so of them put into a chip pill-box will keep up quite a lively rattle, but they seem to get tired after an hour or two of this exercise. In a state of nature they cannot possibly indulge in any athletics because the cocoon is fastened by silken web or threads to a leaf or some other handy substance.—W. M. Christy; Watergate, Emsworth, Hants, July 6th. [See also p. 82.—Ed.]

Colour-changes in Plusia chrysitis. — Referring to Mr. C. N. Bunn's remarks *re* "change of colour in *Plusia chrysitis*" (*ante*, p. 204) and mine (*ante*, p. 159), I have taken many examples this season, some showing the green-bronze, others the gold-bronze; but I am still inclined to think that the gold-bronze is the *emerging* colour, and the green-bronze due to exposure, though, as I have previously stated, I only bred a few, and all were gold-bronze; still I think if a number are bred they will show the same result. I can neither get ova nor larvæ here so far, or I would try the result. Though practically fresh, the green-bronze specimens that I have taken this season appear not so fresh as the gold-bronze specimens. — W. B. Thornhill; Castle Cosey, Castle Bellingham, Ireland, July 1st, 1895.

Larvæ of Acronycta psi in June.—Is not June an unusual month in which to find larvæ of *Acronycta psi?* On June 26th last I took one on lime (*Tilia europæa*) in my garden, and another on the 29th following. The former spun a cocoon on the surface of the earth on the 1st of the present month, but was unfortunately "stung," and an ichneumon pupa is the only result. The second larva is still feeding, and appears to be perfectly healthy. It is, I should say, nearly full-grown. If this is, as I think, an unusual occurrence, I should like to know if any other reader of the 'Entomologist' has had a similar experience. I have, of course, frequently had larvæ of this species stung before, but this has never appreciably delayed pupation, and I do not think that this can be the cause in the present instance; but I am anxious to see if the living larva is "stung" or not. — A. E. ALLWORTHY; 5, Gladsmuir Road, Whitehall Park, N., July 7th, 1895.

POLYPORUS FOR STAGING MINUTE INSECTS.—This seems an excellent material for the purpose; it is not expensive, retains its white appearance, and is easily perforated by the finest pin. When it becomes more generally known there is no doubt this fungus will be adopted in preference to artichoke-pith or any other substance used before its introduction for staging insects. My samples were received from Messrs. Watkins and Doncaster of the Strand. — RICHARD SOUTH; Macclesfield.

NEWSPAPER ENTOMOLOGY.—The following, which appeared in the 'Pall Mall Gazette' of May 27th, is another good example of newspaper entomology. The "omnivorous" collector may be interested to learn that the "large coppers" and "large tortoiseshells" are not extinct (especially the latter), and that the latter also has recently changed its habits, and has taken to hybernating under ground in the larval stage instead of feeding up in the early spring and summer:—"Sir,—In your issue of to-night is a letter assuring lovers of butterflies that the large tortoiseshell and large copper are not extinct, but unwisely naming a locality where one of the two species is abundant. That these rarities are still to be found every one rejoices, but their existence is doomed if facilities are given to the omnivorous collector to exterminate them with insatiable hand. At one of the principal post-offices one of the employees showed me about a dozen large tortoiseshells the other day that he had bred from the chrysalis, and was not ashamed to tell me that he had dug up about eight hundred larvæ of the same rare insect in the New Forest last autumn. Surely butterflies of rare occurrence should be protected as much as birds, and two or three specimens should be the limit allowed to any collector at the same time. It has always been a matter of regret to me that the writers of the best books on butterflies and moths should have boasted in their books of enormous captures of particular species in some locality or other; no one requires more than two or three specimens, and the example to young collectors is surely of the very worst type.—I am, Sir, yours, &c., A Moderate Collector." — RUSSELL E. JAMES; 3, Mount View Road, Finsbury Park, N., London, June 26th, 1895.

DR. WHEELER'S SALE, &c.—On the 10th of July the first portion of Dr. Wheeler's collection was sold at Stevens's, and again very low prices have to be recorded. On the whole the collection was disappointing. True there were, as one would naturally expect, some fine things, especially amongst the fen insects; but the condition all round was lamentably defective. In the first instance many specimens showed signs of rough usage, possibly at the time of collection; and secondly, the collection itself had for some years been dreadfully neglected, mites, grease, and mould having been allowed to accumulate to a deplorable extent. These facts coupled with the time of year will fully account for the prices realised. Two specimens of *Pieris daplidice*, both taken at Newmarket in August, 1872—the *daplidice* and *antiopa* year—realised 16/- each. A fine variety of *Argynnis aglaia*, figured in Barrett, and in which the marginal spots on all four wings had developed into streaked markings, taken at Hickling Broad in 1871, fetched £2 10s. Eight *Vanessa antiopa*, mostly taken in the fen district in 1872, made an average of 8/- each. There were only four *Chrysophanus dispar*, all more or less imperfect; a male realised 21/-, a female £3 10s., and two males set to show the under surface £2 15s. the pair. Lot 34 contained six *Lycæna acis* from Evan John, of Llantresant, and were cheap at £2; whilst Lot 35, containing a like number, some with a history and some without, went for 25/-. *L. arion* is evidently going up in price instead of receding, as one might expect from the number of specimens so recently captured in the South. Two lots of eight and nine fetched £2 2s. and £2. The Sesiidæ were a poor lot. Three Rannoch *Sesia scoliiformis* (1892) fetched 26/-; two single specimens of the same species, with other things, 10/- and 9/- each. *Lithosia caniola*, very moderate examples, fetched about 2/- each. There were seventeen *Lælia cænosa*, and the prices varied even more than the condition; pairs fetched respectively 26/-, 18/-, 12/-, and as low as 6/-; three males 8/-; four males, fairly good ones, 13/-. The female of this species seems to bring more than the male, no doubt on account of the latter being so much more freely attracted to light. No specimen, however, of either sex has, as far as I know, been taken for many years. Two *Lasiocampa ilicifolia*, viz., a very tiny male fetched 12/-, and a nice female, from Castle Eden, 32/6. The collection was rich in *Cleora viduaria*; six pairs made 12/-, 22/-, 24/-, 18/-, and 8/-. Two unusual vars. of *Abraxas grossulariata*, the first asymmetrical, and the second fore wings black with white band and hind wings rayed, brought 20/- and 30/-. Four lots of *Phibalapteryx polygrammata*, four in a lot, realised 24/-, 12/-, 12/-, and 16/-; their condition, however, as before stated, was very poor, some of the bodies being either mere shells from mites, or wanting altogether or in part. Three lots of *Drepana sicula*, three in a lot, went for 21/-, 13/-, and 18/-. Six pairs of *Dicranura bicuspis*, all bred from Tilgate Forest, 26/-, 20/-, 18/-, 10/-, 18/-, and 17/- a pair. A nice variety of *Pygæra curtula*, 21/-; a ditto of *Notodonta ziczac*, 30/-. The "wainscots," in which one would have expected the collection to have been especially rich, were not remarkable, except perhaps as regards *Senta ulvæ*. One lot of seven of the latter, containing the vars. *nigrostriata* and *bipunctata*, with several inferior *Meliana flammea*, fetched 16/-; a similar lot, 12/-. A lot of seven containing the above two vars., with a fine and interesting intermediate var. between *bipunctata* and *wesmariensis*, fetched 32/6, and a fine specimen of the latter variety, 26/-. *Xylomiges conspicillaris* were a drug, and went (with others) for about half-a-crown each. Pairs of *Crymodes exulis*, dark form and good specimens from Perthshire, made

28/–, 28/–, and 35/–; a light form from Shetland, 12/–. A specimen of *Luperina dumerili*, one of the original ones from Portland Lighthouse, fetched £2. Two male *Hydrilla palustris*, 35/–, and a pair, £3, all being taken by Dr. Wheeler at Wicken Fen 1877–1880. The *Agrotis ashworthii* were fine and bred, and made about 2/6 each. The *Noctua subrosea* were only middling (how seldom one sees this in good condition); pairs realised 16/–, 35/–, 21/–, and 20/–.

On the 16th of July Mr. Stevens disposed of a few odd lots of British Lepidoptera, including a long series of *Colias edusa* var. *helice*, and other varieties, the ownership of which was not disclosed, but they were believed to be the property of a well-known London dealer. Most of the *helice*, I should imagine, were bought in. I bought a nearly black *Apatura iris* for 3/–; its price and appearance, however, I am afraid, both point to a foreign origin. A fine *Argynnis aglaia*, nearly black, taken by Mr. Gulliver in 1893, fetched £6 6s.; and another variety, even finer in condition, taken by Mr. Harper in the same year, realised £8 10s., both specimens going to enrich possibly our finest English collection. A beautiful streaked male, also in superb condition, fetched £6, a black *Arctia caia* £3 3s., and one with asymmetrical fore wings 20/–. A female *Chrysophanus dispar*, from Nash's (query Naish) collection, 35/–; two females, in poor condition, 30/–; and a pair, from Bennett's collection, 50/–.—Thos. Wm. Hall.

CAPTURES AND FIELD REPORTS.

Sphinx pinastri in Suffolk.—When driving through the fir woods this afternoon I came across two examples of *S. pinastri* in nearly the same place as I took some specimens in 1892 and 1893. Last year we could not find a single specimen.—Rendlesham; Rendlesham, Woodbridge, June 23rd, 1895.

Deilephila livornica in Sussex.—A curious incident has just occurred. I had just been reading of the capture of *D. livornica* in Devonshire (*ante*, p. 206), and to myself expressed aloud the desire to possess that rare and beautiful species, when the gardener sent in to know if I would go and see whether a large moth was worth catching that had been disturbed whilst cutting the grass upon a bank of irises with a reaping-hook. Judge of my surprise and gratification when I saw a fine large female *D. livornica* settled upon the flint-wall in front of me. In less than a minute I was the fortunate possessor of the very insect I had five minutes before been wishing to obtain. It is a fine female (as to size), though not in its freshest garb, but is a very fair specimen. My gardener seems equally proud, as now he says I cannot say he is always sending for me to come and catch a "buff-tip" or "yellow-underwing."—Chas. E. Morris; Vernon Lodge, Preston, Brighton, July 1st, 1894.

Plusia moneta, &c., in Kent.—On the morning of June 24th one of the servants brought me a fine specimen of *Plusia moneta*, which she had found at rest on a window-curtain. It is a very large specimen, and evidently freshly emerged, judging from its splendid condition. *Cucullia umbratica* seems abnormally abundant this season in this district. They may be taken by the score hovering round the blossoms of the red valerian, for which they have a strong partiality. I also took a good specimen of *C. asteris* at the valerian on the night of June 25th.—H. W. Shepheard-Walwyn; Glensyde, Bidborough, near Tunbridge Wells, June 26th, 1895.

Vanessa urticæ attracted by Light.—A fine specimen of *Vanessa urticæ* flew into my room last night, about 10 p.m., apparently attracted by the gas-light.—T. H. Harker; The Grove, Harrow, July 7th, 1895.

Heliothis armigera at Valerian Flowers.—On July 5th I had the good fortune to capture a very perfect specimen of *Heliothis armigera*, which was hovering over the blossoms of the common red valerian in the garden about 9.30 p.m.—H. W. Shepheard-Walwyn; Glensyde, Bidborough, near Tunbridge Wells.

Macroglossa fuciformis in Middlesex.—I have pleasure in recording the capture of *Macroglossa fuciformis*, an example of which fell to the net of my brother, Percy H. Smith, on the morning of June 16th, in Eastcote Woods. The specimen is somewhat battered.—C. Rhoades Smith; Greenhill, Harrow, July 4th, 1895.

Agrotis ashworthii.—While spending a few days at Llanfairfechan, early in July, I made a pilgrimage to the Penmaenmawr locality for the above insect, and was fortunate enough to take, after two visits, eight perfect specimens, seven at rest and one at sugar; I sugared on two occasions, but only took the one example of *A. ashworthii*, though scores of *Xylophasia polyodon*, &c., came to the sweets. I also found, by close searching, a considerable quantity of ova, and now have about 150 larvæ feeding well on sallow.—R. Tait, Jun.; Cheetham Hill, Manchester.

Apatura iris.—On the 13th I was fortunate enough to take a male *Apatura iris* on the wing, in splendid condition, at Lyndhurst, Hants.—Geo. Stanley Morley; Oakdene, Epsom, July 16th, 1895.

Venusia cambricaria in Wales.—I should like to know if *V. cambricaria* has been recorded from Wales in recent years. Newman writes, "is said to have been taken in Monmouthshire." On the 9th inst. I took a very nice specimen near Avenig, in Merionethshire. My friend Mr. Woodforde and myself took twenty-eight specimens of this insect in a wood near here on the 6th and 7th inst.—E. W. H. Blagg; Cheadle, Staffordshire, July 18th, 1895.

Variety of Arctia caia with Yellow Hind Wings.—On June 26th a specimen of *A. caia* emerged, in which the hind wings are a good yellow, with the usual blue markings, differing but slightly from the ordinary form. The fore wings have a whiter ground than usual, but the markings are very distinct. The body is yellow, with four black stripes, and the collar on the head is dark yellow, but not very distinct. The specimen was bred from a larva taken in the district with others, three of which have yellow bands (and one with spots as well) round the blue spots on the hind wings.—J. T. Fountain; 58, Darwin Street, Birmingham, July 17th, 1895.

SOCIETIES.

North London Natural History Society.—The usual Whitsuntide excursion to the New Forest started on Friday, May 31st, 1895. Messrs. Robbins, Nicholson, and Bacot met at Waterloo at 5.30, and journeyed by the 5.50 train to Southampton. On arriving at Lyndhurst the party was augmented by Mr. Harvey, who boarded the bus half-way between the station and the town. On arriving at No. 2, Lynwood, the usual generous spread was discovered, and was rapidly reduced to scarcity by the efforts of the four hungry North Londoners.

The following morning turned out cloudy and wet, and an early excursion by Messrs. Bacot and Nicholson produced no result worth mentioning. The morning continuing showery and unpropitious, Messrs. Robbins and Nicholson stayed indoors till just before dinner, when they essayed a little larva-beating in Beechen Lane, but the result as regards the larvæ was a decided failure. In the afternoon these gentlemen repeated the experiment of the morning in Denny Wood, and the principal captures were a fine *Notodonta trepida*, a good *Anaitis plagiata*, and a brown specimen of *Grammesia trigrammica*, all evidently just out; and larvæ of *Asphalia ridens*, *Brephos parthenias*, and others. Messrs. Bacot and Harvey also visited Stubby and Denny Woods, and added *Tæniocampa miniosa* and *Amphidasys strataria* among others to the list of larvæ, and extended the records of imagines by *Tephrosia punctularia*, *Bupalus piniaria*, and *Scodiona belgiaria*, &c., &c. In the evening the party proceeded to sugar about half a mile of trees in Hurst Wood, and took *N. trepida* for "assembling" purposes. The sugar, however, proved totally unattractive, as also did the *trepida*; the latter result was not surprising, as the specimen on further investigation turned out to be a male. The only captures made were some fine specimens of *Larentia viridaria*. The night was clear, cool, and damp, and there was a bright moon.

On Sunday Messrs. Bacot and Harvey spent the day at Stubby and Denny Woods, and by beating obtained about 120 larvæ of *Tæniocampa miniosa* and some two dozen *Asphalia ridens*; *Euclidia glyphica* and *Thera variata* were also captured in fine condition, likewise two male *Pararge egeria*. After church Messrs. Robbins and Nicholson went for a stroll along the Minstead Road, and took some good specimens of *Tephrosia punctularia* and *Thera variata*, and a freshly emerged *Hadena thalassina*. These were found at rest on young firs on a piece of boggy land, which was plentifully bespattered with the two sundews (*Drosera rotundifolia* and *D. longifolia*) and the bog asphodel (*Narthecium ossifragum*). A moth believed by Mr. Robbins to be *Lobophora halterata* was seen, but unfortunately missed. In the afternoon Mr. Quail turned up about four o'clock, having taken a fresh specimen of *Hadena genistæ* on the way from the station. In the evening the whole party went to Matley Bog, but with the exception of some good specimens of *Hypsipetes trifasciata*, *Lobophora sexalisata*, *Eupithecia nanata*, and *Pachycnemia hippocastanaria*, nothing fresh was turned up. A nice lot of *Scodiona belgiaria* were captured on White Moor afterwards in bright moonlight.

On Monday morning Messrs. Bacot and Quail were out early, but did not take anything of note except a fine specimen of *Acronycta leporina*. After breakfast the party set out to spend the day at Stubby Copse, capturing on the way some fresh specimens of *Tanagra atrata* and two *Nemeobius lucina*. Larva-beating produced about half a dozen *Pœcilocampa populi*, two or three *Asteroscopus sphinx*, one *Thecla quercus*, and many other commoner species. Mr. Nicholson found a larva of *Limenitis sibylla* suspended from a grass-stem, ready to pupate; and Mr. Harvey found another *A. leporina* at rest on a fir-trunk. The party then adjourned to New Copse Cottage for milk, and afterwards wended its way back to Lynwood for tea, returning home the same evening.—Lawrence J. Tremayne, *Hon. Sec.*

South London Entomological and Natural History Society.—*June 13th*, 1895.—Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Frohawk exhibited a dark leaden-blue var. of *Lycæna bellargus*, Rott., taken at Weymouth in 1892. Mr. Perks, a *Julus* taken among bananas in Covent Garden. Remarks were made by several members on the season, and a few records were made of the appearance of *Colias edusa*.

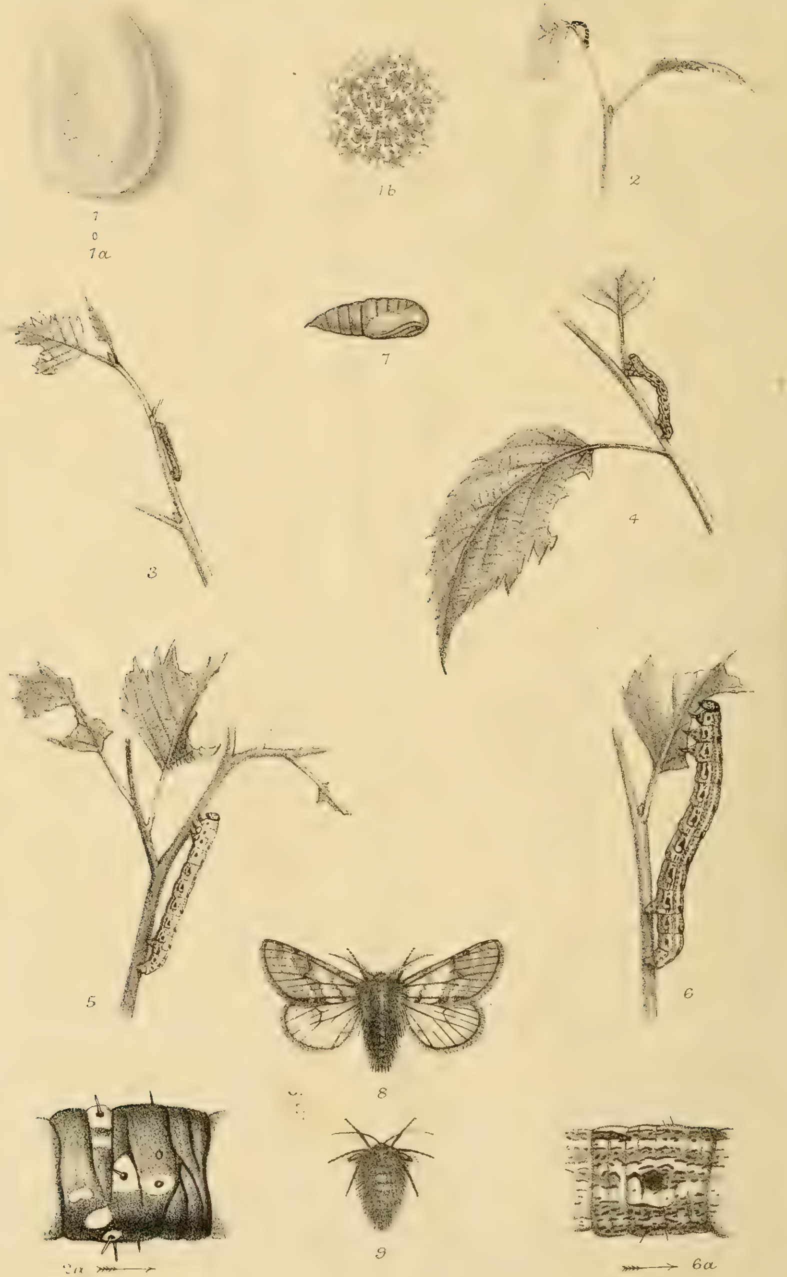
June 27th.—The President in the chair. Mr. Jäger, a series of *Arctia lubricipeda*, Esp., bred from *radiata* parents. Among them were both var. *radiata* and var. *fasciata*, as well as some almost normal types. Mr. Turner, eggs of the lace-wing fly. Mr. Dennis, a larva of *Catocala nupta*, L.; a pupa of *Lycæna argiolus*, L.; and a pale specimen of *Argynnis selene*, Schiff. Mr. West (Greenwich), specimens of *Cryptocephalus nitidulus*, Gyll.; *C. aureolus*, Suf.; and *Elater elongatulus*, Ol., all taken in Headley Lane on June 3rd.—Hy. J. Turner, *Hon. Report Sec.*

Birmingham Entomological Society.—*June 17th*, 1895.—Mr. R. C. Bradley in the chair. Exhibits:—By Mr. A. H. Martineau, *Sinodendron cylindricum*, male, from Solihull; *Criorrhina asilica* from Trench Woods; and some unusually fine specimens of *Andrena rosæ* var. *trimmerana* from Clifton Downs. By Mr. Abbott, a number of Lepidoptera taken during a three days' trip to Wicken at the end of May; amongst others were *Arsilonche albovenosa*, *Meliana flammea*, *Nascia cilialis*, *Acontia luctuosa*, *Myelophila cribrum*, *Earias chlorana*, *Lithostege griseata*, *Hydrelia uncula*, *Bapta taminata*, and *Phibalapteryx lignata*. By Mr. C. J. Wainwright, fine series of *Asthena luteata* and *Eupisteria heparata* from Cannock Chase. By Mr. R. C. Bradley, a number of grassheads from Sutton Park covered with great numbers of *Melanostoma scalare*, which had been killed by a fungus. He found great numbers, but only in a spot a few yards square; and all were on the grass flowerheads only. There was only the one species too; they had evidently been attacked by the fungus and had then gathered together at the one spot to die. While he was watching they continued to arrive and remained to die. He also showed an ichneumon, the thorax of which, when taken, was covered with bright red parasites of large size; it made the insect look, when caught, as if it had a very large bright-red thorax. The parasites seemed like beetle larvæ. He also showed a specimen of *Crabro palmipes*, with a cluster of eggs at the base of the wings on one side; both these were from Sutton. By Mr. Valentine Smith, the following from Cannock Chase:—*Pterostichus lepidus*, *Cymindis vaporariorum*, and *Thymalus limbatus*. — Colbran J. Wainwright, *Hon. Sec.*

RECENT LITERATURE.

A Manual for the Study of Insects. By John Henry Comstock, Professor of Entomology in Cornell University, and in Leland Stanford Junior University; and Anna Botsford Comstock, Member of the Society of American Wood Engravers. 8vo. Ithaca, N. Y. 1895. Pp. xii, 701. Six plates (one coloured), and woodcuts.

In the present handsomely got-up and extremely *heavy* volume (in the literal sense), Prof. and Mrs. Comstock have published a very useful work, profusely illustrated by the "Junior Author," on the insects of the United States. It consists of a series of chapters: one devoted to Zoological Classification and Nomenclature; another to Crustacea, Arachnida, and Myriapoda, in which the largest amount of space is allotted to the spiders, and the remainder to the seventeen orders into which Prof. Comstock divides the insects proper, the old order Neuroptera especially being broken up into no less than ten. Several of the other orders are divided into "suborders"; thus the Anoplura are treated as a degraded "suborder" of the Hemiptera, and placed between the other two "suborders," the Heteroptera and Homoptera. The Rhynchophora are also treated as a separate "suborder" from the remainder of the Coleoptera; and, what will seem stranger to many British entomologists, the Lepidoptera are divided into two "suborders," the Jugatæ and Frenatæ: the first containing only the Hepialidæ and Micropterygidæ (distinguished by having the fore and hind wings similarly veined, and connected by a long lobe instead of a frenulum); and the Frenatæ, including the remaining Lepidoptera, commencing with the Psychidæ, Cossidæ, &c., and ending with the butterflies. All systematists know the impossibility of attempting to sketch out a linear system which will carry on one order, or even, in many cases, one family, to the next, through the genera which are really the intermediate links; but we do not see that the existing arrangement is improved by ending the Lepidoptera with the Nymphalidæ, and passing on to the Diptera as the succeeding order. A great number of good illustrations are given of typical North American insects of all orders; and the tables of families and genera, though they cannot of course be expected to apply throughout, except to American species, will be found of great value to all entomologists. Notwithstanding certain defects and deficiencies, to which we need not further allude here, we can cordially recommend this book to any British entomologist, whether a beginner, or a student who already possesses some knowledge of Entomology, who wishes to extend his knowledge beyond the confines of our own islands.



F.W.Frohawk del.et lith.

West,Newman imp.

Nyssia lapponaria.

THE ENTOMOLOGIST

VOL. XXVIII.] SEPTEMBER, 1895. [No. 388.

LIFE-HISTORY OF *NYSSIA LAPPONARIA.*

By F. W. Frohawk, F.E.S.

Plate I.

On May 6th last I received from Mr. W. M. Christy some va of *Nyssia lapponaria*, who very kindly sent them to me for the purpose of figuring and describing the insect in its various stages; and having done so I now have the pleasure of publishing the following life-history and accompanying figures of the species through all its stages.

Figs. 1, 1*a*.—The ovum is of a compressed oval form, with one end rather larger than the other, and measuring in its greatest diameter $\frac{1}{26}$ in.; the surface is delicately and beautifully reticulated with a quinquefarius pattern; each cell is mapped out with finely raised ridges shown in Fig. 1*b*. The colour is of a very clear bright greenish-yellow; a few days before hatching it deepens in colour, and gradually becomes deeper, until, shortly before hatching, it assumes a very deep metallic blue-green hue. The ova hatched between 5 and 6 p.m. on May 16th. Directly after emergence the larva measures $\frac{1}{12}$ in. while extended; if disturbed it falls, suspending itself by a web, and if falling upon the ground remains for a short time in a looped attitude.

Figs. 2, 2*a*.—The larva in its first stage and when ten days old; it is $\frac{1}{6}$ in. long, cylindrical, and of uniform thickness throughout; the ground colour is a deep dull black; the first segment has the anterior edge white, forming a collar and encircling the segment; immediately behind the collar is a series of very minute warts, each beset with a short fine bristle; the 4th, 5th, 6th, 7th, and 8th segments are each encircled with a number of pure white markings, consisting of fourteen on each segment (seven on either side), Fig. 2*a*; the dorsal pair are longest, and are separated by a medio-dorsal black line; these, as well as the two largest lateral spots and the lowest ventral one, have each a black central wart emitting a short whitish bristle; the 2nd, 3rd, 9th, 10th, 11th, and 12th segments are principally spotted on the lateral region; the head is black, with white spots at the mouth; the legs and claspers are black. During the first stage the larvæ fed upon both birch and whitethorn, and appeared to prefer the latter if one more than the other. The first moult occurred on May 31st.

Fig. 3.—Before second moult, twenty-one days old, it measures $\frac{3}{10}$ in. long; the ground colour is lilac-brown with fine white longitudinal lines running the entire length, which are dorsal, sub-dorsal, super-spiracular, and sub-spiracular; on the 4th, 5th, 6th, 7th, and 8th segments are six lemon-yellow spots (three on each side), and of the same form as in the previous stage, one being dorsal and forming a transverse mark, the other two on the spiracular line, one elongate transversely, the second round, and each having the black central wart emitting a short hair as in the previous stage; the head, legs, and remaining details being likewise similar. It rests in a straight attitude, with the head slightly bowed, and the first three anterior segments slightly arched, thereby drawing together the two first pairs of legs; a silk cord from the mouth is attached to the stem while resting. The second moult took place on June 6th.

Fig. 4.—Before third moult, when twenty-six days old, it is $\frac{9}{10}$ in. long; the body is of uniform thickness and cylindrical; the ground colour is whitish with a lilac-grey tinge, becoming yellowish shortly before moulting; it is chequered with black markings that are arranged in longitudinal bands, which are medio-dorsal, sub-dorsal, super-spiracular, and spiracular; the spiracular row is formed principally of conspicuous black blotches, commencing on the 4th and ending on the 11th segments; immediately below these markings is a series of bright light yellow markings running the entire length; the dorsal markings, as in the previous stage, are also bright yellow; the ventral surface is similarly coloured and lined as on the dorsal region, but rather uniformly darker; the head, legs, and claspers are grey, speckled and streaked with black. It generally rests in a straightened attitude. The third moult happened on June 11th, and directly after moulting the ground colour is a light olive-yellow; all the markings are as in the previous stage, but brighter and more clearly defined; the head, legs, claspers, and anal segment are all of a clear pinkish-white speckled with pale olive, the colouring of these parts remaining such but for a short time. The cast skin is not eaten by the larva of this species.

Fig. 5.—Before fourth moult, thirty-two days old, it measures $\frac{9}{10}$ in. As in the previous stage it is cylindrical, and of uniform thickness throughout; the ground colour is pale primrose-yellow; the longitudinal bands, which are outlined with fine

black lines composed of numerous black specks and streaks, have the inter-space of a leaden-drab colour, these bands being divided by primrose-yellow lines, thus forming longitudinal rows of alternating stripes; the leaden-drab stripes are medio-dorsal, sub-dorsal, super-spiracular, and spiracular; on the latter band are situated the spiracles, which are small and intensely black; each is placed on a squarish dull deep black spot forming a conspicuous row of spots, each is bordered on the lateral and posterior sides with bright lemon-yellow, the yellow being again relieved laterally by a black streak; on the posterior half of each segment uniting the medio- and sub-dorsal bands is a short transverse lemon-yellow bar united to a black spot in the sub-dorsal band; the remaining details are in every way similar to the previous stage. It rests in a straight position upon the stems of birch, frequently straight along the stem, but sometimes only with its claspers grasping it, and the head a short distance away, but always with a silken thread from its mouth to the stem. The fourth and last moult took place on June 18th.

Figs. 6, 6*a*.—After fourth moult, forty-two days old, and fully grown, it measures 1½ in. in length; in every detail the preceding description agrees precisely with this stage, excepting that the yellow markings are now rather deeper, of a gamboge-yellow, and the ground colour of the dorsal surface is also rather deeper, and of course the size increased when fully grown. The ground colour varies in different specimens; of the four larvæ in my possession three having the yellow of different depths, and the fourth of a decided lilac-drab hue; this, with the black markings, assumed quite a deep drab-brown, closely resembling the colour of the birch-stems.* The first larva buried for pupation on June 27th, remaining in the larval state forty-two days.

Fig. 7.—The pupa is $\frac{6}{10}$ in. in length; the head and thorax uniformly rounded in front; round the middle of the wings it is rather contracted; the fifth abdominal segment, including the apical portion of the wings, is swollen; the remainder of the abdomen being attenuated; the posterior segment terminating in a slightly curved conical point cleft at the end; on the same segment at either side is also a short point; the entire surface is finely granulated; the head, thorax, and abdomen of a deep red-brown; the wings, antennæ, and legs are light sienna-red; the eyes are rather conspicuous and blackish. It has no cocoon, being simply buried an inch or two under the surface of the earth.

The following descriptions are taken from a pair of specimens kindly lent me by Mr. Christy:—

---

* Mr. Christy, referring to this colour variation in a letter recently received from him, says: "The ground colour varies considerably; I have had them dark purplish-brown so that they matched the birch-twigs, and I have had them almost putty-coloured."

Fig. 8, Male.—Measures in expanse $1\frac{5}{12}$ in.; in general form resembling *N. zonaria*. Primaries, ground colour is greyish-white with a slight ochreous tinge, which colour chiefly occupies the whole of the basal half; four transverse smoky-black bands traverse the wing, the first one is narrow, and situated on the basal fourth, the second traversing the middle, and disconnected from the third by a narrow band of the ground colour, the latter is simply separated from the marginal band by a fine and indistinct zig-zag pale line; all the bands run parallel with the hind margin, and are deep black on the costa and inner margin; the neuration and hind margin is clearly defined by black; the costa is bright orange-tawny, which is sharply broken up by the black of the four bands; the fringe is smoky-black. Secondaries rather duller in ground colour, and having a mere indication of a submarginal whitish band, and a central blackish band indicated by a short transverse bar at the inner margin, and again by the faintest bar close to the disco-cellular nervule; the neuration, margin, and fringe similar in colouring to the primaries; antennæ are strongly pectinated; head, thorax, abdomen, and base of legs thickly clothed with long hairs, which are black, grey, and orange-tawny, the latter occupying the front of the head, sides, and down the centre of the thorax and down the centre of the abdomen, where they are shorter and grouped in tufts, one on each segment; the legs are black.

Fig. 9, Female.—Apterous; antennæ are simple, but when viewed with a strong lens they appear rather thickly scaled and slightly ciliated; the head, thorax, abdomen, and legs are similar in colouring to the male, but the thorax is less hairy in the female.

Mr. Christy has kindly communicated the following concerning the habits of the imago:—

"The insects are decidedly sluggish and disinclined to fly, even at night. My idea is that their time of flight is in the day, and when the sun shines. The ovipositor of the female is very long, quite a quarter of an inch. The eggs were laid through some green leno; several folds of it had been tucked inside a chip-box, and the eggs were laid between the leno and the box. The female must be able to push her eggs into any chink or crevice quite out of harm's way. I have noticed that *Amphidasys strataria*, *A. betularia*, and *N. hispidaria* all like to deposit their eggs in the same way, that is, pushed a long way into some narrow chink, or between folds of muslin or leno. The eggs are laid in a rough untidy batch, sometimes somewhat overlapping one another, precisely after the manner of *N. hispidaria*, and to the naked eye they are in size and shape exactly like those of that species, but the colour is different. The female when alive is round and plump, but loses its shape when killed, and becomes flattened and wedge-shaped towards the tail. She will live for two or three weeks."

VARIETAL TERMINOLOGY.

By W. F. de Vismes Kane, M.A., F.E.S., &c.

Mr. Mansbridge's paper on varietal terminology (*ante*, p. 213) broaches a subject which it would be very desirable to have settled, and the question, being a more or less abstract one, should certainly be capable of easy solution by a consensus of opinion, though its strict application may always offer some difficulty. The standard unit of classification must be the species. And however the definition of a species may be enunciated, there seems at least one essential and fundamental element which must enter into it, *i. e.*, the capability to produce fertile progeny. There may of course be exceptions to the rule of hybrids being sterile; but the law is sufficiently stringent to supply a working basis. Therefore all variations that are capable of producing fertile offspring from a union with the typical specific form are merely subsidiary deviations from the central type. It certainly would be advantageous, if it were possible, to select in every case the central and most universally prevalent form of each species for the type of each group. But the necessities of synonymy require us to maintain the first described form as the type of the species; and this system, though biologically defective, is not beset with much practical inconvenience. What, then, are the lines we should follow in indicating the various deviations from the type; that is, a form which represents theoretically a perfect succession of typical characters?

In the first place, it is undeniable that each individual of the progeny invariably, so far as we can ascertain, differs in some degree, however small, from the parents. Where the divergence is sufficiently appreciable to make it convenient to ear-mark it, it may be well to name it and class it as an "aberration,"—a term wide enough to include every (no matter how narrow or wide) branching from the main stem. The greatest part, however, of such aberrant forms disappear as they arise, mainly through the action of extensive interbreeding, and so these eccentricities become neutralised by the operation of the law of heredity. But when isolation becomes a factor, and compels in-and-in breeding among such aberrations; or some similar determinant interferes, such as the principle of the "survival of the fittest"; the aberrational characteristic becomes fixed and inherited in a more or less degree; thus giving rise to a permanent "variety." As in a kaleidoscope, there are patterns rapidly succeeding each other, and disappearing never to return except after the lapse of long periods; while others, from the nature of the materials, reappear more or less identically at frequent intervals, offering salient characteristics worth notice. And similarly with the shifting factors which control zoological evolution; for we find from time to time aberrations cropping up, which would not seem to be founded upon any ancestral tendencies, but to be sporadic, and which only evidence the production of similar results from similar causes. The very rare and strangely similar aberrations of the undersides of certain of the Vanessidæ are cases in point.

When, however, recurring inherited variations occur and are either local or resulting from seasonal influences, or from what is termed mimicry, &c., we feel it necessary to define their characters more fully than by the inclusive term "variety" formerly applied to all. In classification, however, it hitherto has been thought sufficient to compile a list discriminating only on the one hand between the adventitious or occasional appearance of any variation meriting record, and on the other, those of similar importance which are reproduced in inherited sequence. These classes of forms are almost universally termed "aberrations" and "varieties" respectively in such catalogues as Staudinger's. A few authors, indeed, shut their eyes to even this fundamental distinction, which indicates a difference between the fleeting and the stereotyped variation, and apply the term "variety" to every deviation from the specific type. It is true that the border line between the stable and the unstable form is not absolutely definable; but if such an objection be insisted on, we should have to acknowledge what we must be convinced of theoretically, that the definition of species is beset with similar defects. But this school is not likely to satisfy the requirements of the present day, for the tendency, as pointed out by Mr. Mansbridge, is rather to adopt a more complex terminology, capable of more precisely indicating the idiosyncrasy, so to speak, of the variety in question. And though in classified lists a multiplication of such terms might be redundant and unnecessary, yet in zoological literature their use is almost imperative as our knowledge accumulates. The question therefore becomes narrowed into the consideration of what classes of varieties require special designations suggestive of some salient feature of their phylogeny, or distribution, or morphological attributes. And here I would point out that some synonymous general terms are very valuable. The words "variation" and "form" are of the utmost value to a writer when he wishes to avoid tautology, or speak indefinitely. The "forms" or "variations" of any species may thus be spoken of generally; and then defined particularly as "aberrations" or "varieties" as the case may be. It would be a pity to abolish our indefinite terms; for if we do, literary necessities will oblige other substitutes to be employed. The terms "form" and "variation" therefore might advantageously remain without any restrictive application, as has generally been the usage hitherto. Now as to the divisions into which it might be desirable to arrange varieties. One of these should embrace such forms which have apparently a congenital origin, such as those which reappear from time to time without any assignable environmental interference. The black variety of *Amphidasis betularia* may be instanced, which crops up sporadically in many districts without founding a permanent colony. In other localities, however, it has become a local race, and requires to be suitably designated. Many other varieties also appear to be entirely referable to ancestral tendencies, occurring in wholly divergent climates, and in regions widely differing in geological and meteorological conditions. Such, I think, are certain of the varieties of *Aporophyla lutulenta*. It would be equally necessary to designate sexual and seasonal dimorphic varieties, mountain forms, and those which depend on a high or low range of temperature, or mimicry. The late Mr. Jenner Weir suggested certain terms for some of these; and "oromorphic" and "pediomorphic" have been used for mountain and lowland varieties; but until zoological authors generally come to some common decision on the subject, any writer of less degree who avoids a periphrasis by the use of unusual terminology, runs the risk of the stigma of pedantry.

Drumreaske, August, 1895.

THE SENSES OF INSECTS.

By J. Arkle.

In the 'Entomologist' (*ante*, p. 30) Mr. Watson contributes an interesting article on these speculative topics from the standpoint of the scientist, while I, in a previous number (Entom. 336) record some observations which may occur to the lay mind.

The error of supposing the existence of an additional sense in insects appears to have partly arisen from a misconception of the power of smell. But, asks Mr. Watson, "What about the antennæ?" There is, indeed, much to be said about the antennæ, for "authorities" have loaded them with almost every sense, including this popular superstition. But why the special development in those of the male? Simply, I reply, because, at any rate in Lepidoptera, the male *seeks* the female, as is proved by the habit of assembling. Therefore the male requires, according to circumstances affecting species, special developments in these antennæ or feelers.

Whether the pituitary body in vertebrate embryos, or, indeed, that anomalous organ in the adult human brain, be a sense structure, a glandular body, or partly sensuous and partly glandular, are matters which still exercise the physiologist. Puzzles they still remain when we exclude such words as "probably" and "may." But let us accept the organ, for the moment, as thoroughly understood,—as the seat of a sense or function now lost,—and contemplate the survey of vertebrate atrophy. The internal and external ear form one of the most popular studies in animal physiology. This is not the place to attempt anything like a description, so I will refer the reader, if necessary, to such text-books as 'Elementary Lessons in Animal Physiology,' by the late Professor Huxley. And I feel sure that a digest of the subject will secure my pardon for refusing to believe there can be any analogy between our auditory mechanism and the gill-cleft of a fish. The tympanum alone shows fixed design—and by a Master Hand who knew his mind.

Dictionaries may tell us atrophy means a wasting away, but, amidst the hypothetical structures supporting an additional sense, it is pleasant to find that the human vertebrate, if anything has been lost, has nevertheless been a gainer on the whole. Our progenitors may have had antennæ, or revelled with the fishes in the vasty deep; but we are more comfortably off in the mechanism of hearing, and live in drier conditions. We live longer, and our dimensions have so enlarged that we cannot get inside the armour of our forefathers.

Coming back to Entomology, what is this supposed sense? Obviously it is a sense of direction, whatever other adjunct it may possess. But Sir John Lubbock, supported by Mr. Romanes, shows, in his 'Senses of Animals,' "that there is no sufficient evidence among insects of anything which can justly be called a sense of direction."

Let us now consider what is meant, entomologically, by "assembling." It is a gathering of the male sex to the female, and from distances clearly beyond the reach of sight or sound. It cannot be confounded with such phenomena as the stridulation of beetles. It has been abundantly proved (Entom. xxvii. 337) to be the result of extraordinary powers of smell. But Mr. Watson concludes, from a note by the Rev. G. H. Raynor (Entom. xxv. 121), that some other influence is at work in addition to that of scent. What are Mr. Raynor's words? They are these:—"Even during a stiff breeze I have seen males *come up* from all quarters of the compass"—the italics are mine. Unless Mr. Raynor corrects me, I regard the last phrase as a figurative expression, or why use the words "come *up*"? If the quotation is to be taken literally, then I venture to say Mr. Raynor's experience stands alone, and is even unsupported by Mr. Watson, who quotes it. For what does Mr. Watson say? He says:—"Scent cannot travel against the wind, and in all the assembling expeditions I have been on, the males always came against the wind; and when, in their eagerness, the males overshot their mark and went past the female, they lost the scent and flew up, soared away on the wind, dropped close to earth again, and then, having regained the scent, came sailing along."

In approaching the question of hearing, it is interesting to observe two great insect divisions—those which emit audible sounds and those which do not. In the first division, the bee, housefly, gnat, some of the beetles, cricket, and grasshopper may be cited as examples; in the second, butterflies, moths, dragonflies, ants, and many dipterous insects. I am aware that objection may be made to this classification, but it is the result of close observation. In the prevailing desire to show that all classes of insects produce audible sounds, I feel bound to say that science in making the claim for, say, dragonflies and the peacock butterfly (*Vanessa io*), appears driven to extremity. And my observation compels me to doubt if the hum of the bee, as an example of humming insects, is to be at all attributed to wing-vibration. Rather is it, I believe, to the possession of musical spiracles used in flight for the inflation of the body. Nature has landscape sounds for our ears, just as she provides scents for smell or colours for the eye. What though all insect sounds are not agreeable—neither are all flower scents, or flower colours! For monotony is not conducive to human pleasure, but contrast is! Enough, however, has been said to show that some insects produce audible sounds, and I have dilated upon the point because it has been suggested that such insects can necessarily hear. On the other hand, it is obvious that the mere ability to produce sound is no proof that a creature can hear at all.

Stories, nevertheless, are related of scientific observations pointing to the conclusion that some, at any rate, of the insects named can not only hear, but interpret the sounds they produce. If in the study of these narratives there arises a suspicion that science can end and enthusiasm begin, there is certainly a general testimony in favour of the possession of auditory powers which has all the weight of highest authority. Thus we hear of the queen bee using her vocal chords in an address to her subjects, the beetle finding his mate by her stridulation, the female cricket the male by his chirruping, &c.

References such as these would be incomplete if the scientist could not point to auditory "organs" in sound-producing insects. Instead of loading the antennæ with sole responsibility, these structures are now considered to divide the function with others distributed over various parts of the body. Thus we are told of the "halteres" at the wing-bases of flies, the tympanum on the first abdominal segment of true locusts, and the ears carried by crickets on their legs. Touch, we know, is distributed over the whole of an insect's body. Whether these microscopic "organs" are in conjunction with touch, or hearing, may for the present be dismissed to the specialist and the lens of the future. Neither can I afford more than a passing reference to what is inferred from the behaviour of a gnat fixed to a microscope-slide. If similarly fixed, with our hands free, we should, on the slightest visible movement, act exactly with our "feelers." The insect may have exhibited only sensitiveness to concussion or vibration, which is an entirely different thing from hearing. And the alleged "love song" of the gnat happens to be the same as that of the mosquito—a fact which may be of use to the student in the origin and development of species.

Admitting evidence in favour of the auditory powers of certain insects, let us take the following illustration, since Lepidoptera are included, as a test of their efficiency and scope. Here is a cavalry regiment coming along the street preceded by its band! The band rein up close to the parapet, and play the troopers past to their billets. Just behind, and resting under a window-sill, is a *Melanippe fluctuata*. Neither the metallic clink of the cavalry horse-shoes, nor the different classes of musical sounds through all the instruments down to the kettledrums, cause our insect to move in the least. When the band and troopers are gone, we touch its wing-fringe with a walking-stick, and away it goes! *M. fluctuata* is evidently an example whose acoustics do not include an antithesis. It is useless to suppose the moth sensitive to sounds beyond our auditory powers. Such sounds must be shown to exist.

The incident just related is an illustration from one of the classes of insects I regard as mute and deaf. Further, it is a fair sample of the behaviour of any insect tested by similar circumstances. Assuming certain species possess auditory powers, hearing, even in their case, is a most rudimentary sense, and far inferior to what is understood by the term as applied to vertebrates. It serves no purpose as a warning and protection. Nor is this fragment of a sense as generally exhibited as the sense of sight. Neither the simple nor the compound eye in insects is governed by muscle control, that is, there is no focussing power. I have never, therefore, been able to detect an insect that could distinguish an object at more than a dozen yards on the most liberal computation. Yet the sense of sight, so far as it extends, is so universally distributed that any insect can be made to demonstrate that it can at any rate see light. There may, however, so we are told, be fifty additional, aiding senses. If, I reply, it can be shown there is one, we may well reconsider our place in the ranks of created things, and our right to put an insect into the cyanide bottle.

Chester, August 13th, 1895.

ON THE ORIGIN OF THE EUROPEAN RHOPALOCERA, AND THE EFFECTS PRODUCED BY THE GLACIAL PERIOD UPON THEIR PRESENT DISTRIBUTION AND DIVERSITY.

By W. Harcourt Bath.

Geologists inform us that there was a period in the history of this planet when the earth existed in a molten red-hot state, analogous to that which holds sway at the present time in the smaller mass of Mercury. During the course of many millions of years its great heat gradually sublimed, until it was reduced to a temperature capable of supporting animal and plant life.

The two extremities of the earth were most probably the first points where life first commenced to make its appearance, since they were undoubtedly the first portions of this planet which possessed a sufficiently low temperature for its production. But whether the North Pole or the South Pole was actually the first to evolve animals and plants, is a problem which requires elucidating; likewise as to whether two identical or distinct groups of fauna and flora came into existence at either extremity independent of each other, and which for a long time were unable to intermingle on account of the equatorial regions being still in too thermal a state to enable them to do so.

Butterflies are, however, geologically speaking, of comparatively very recent origin, according to the evidence furnished by palæontology, and the place where they were first produced was most probably somewhere in the equatorial regions of the earth. Tropical America very likely constitutes the cradle of their birth, on account of the wonderful development they receive in this region both as regards numbers and variety. In the basin of the Amazon and adjacent countries to the north there exist about 5000 different species out of a total of 10,000 known to science, that is, 50 per cent. of the rhopalocerous fauna of the globe.

During the course of many thousands of years succeeding they became disseminated through all portions of the earth, and up to the commencement of the great glacial period there was probably a rich rhopalocerous fauna found in most parts of Europe. It is the influence of the above climatic conditions, as affecting the present distribution and diversity of the European Rhopalocera, with which I propose to deal in the present paper.

During the height of the glacial period, that is when the ice-cap attained to its maximum dimensions, the major part of Europe north of the Pyrenees, Alps, and Carpathians, was covered by a vast field of snow and ice, which accumulated to such an extent during the severe winters that the heat of each succeeding summer was unable to sublime it. The butterflies which had formerly existed in this area were either all extirpated or had been driven south to the edge of the ice-cap, where alone their pabula could survive. At this period all the countries bordering on the Mediterranean must have possessed a fauna and flora somewhat similar to that which now reigns supreme in Scandinavia at the present day.

Upon milder climatic conditions ensuing the ice-cap, which had previously enveloped Europe in its clutches like a gigantic cuttle-fish, gradually receded, carrying in its trail those butterflies and their food-plants which had continued to survive upon the southern edge of its area. Thus we find existing at the present day in high latitudes, and also at considerable altitudes upon mountains, where climatic conditions prevail parallel with those which existed during the glacial period, the most ancient forms of the various genera and species. These have in many cases since branched out into numerous other forms, under more favourable physical surroundings, in lower latitudes and at less elevated altitudes.

In the north, Scandinavia, Lapland, and Finland constitute the happy hunting-grounds of those who wish to meet with these ancestral forms; while further south they may only be obtained on the Alps and Pyrenees, and other mountain-ranges of Central Europe which are of a sufficient vertical elevation, and furnish zones with an equivalent vegetation to those now existing in arctic and subarctic regions.

When the major part of Europe was submerged beneath a sea of snow and ice, other large portions of the palæarctic area were left uncovered, at least were free from it in the summer time. This consisted of land even further to the north than the glaciated western continent, namely, in Siberia. The reason of this is, as has been ably demonstrated by Prof. A. R. Wallace, that in order to induce glaciated conditions a certain amount of humidity must occur, whereas this was absent in the region in question, as is evidenced by the non-presence of geological proof to the contrary, such as ice-scratchings, &c. At the same time the cold may have been much more intense in the winter, although in the summer, the land being free from snow, vegetation could make its appearance, together with the attendant butterflies. It is highly probable, therefore, that many species of the latter were perpetuated and survived within this area during the glacial period, which, upon more favourable climatic conditions making their appearance in Northern and Central Europe, spread westwards, and intermingled with those which at the same time advanced northwards from the south.

As the result of his investigations, Ernst Hoffmann asserts that of the 290 species of Rhopalocera inhabiting our continent at the present time, no less than 173 were originally derived from Siberia. If this was the case, and it seems very likely to be correct, the majority of them probably immigrated westwards at the commencement of the pleistocene period, for they must be of great antiquity; moreover, it is unreasonable to suppose that many of the species could not have existed also in the South of Europe, even at the climax of the glacial epoch. According to the same authority, only eight species have been derived from Africa and thirty-nine from Asia, south of Siberia; that is, the oriental region of Prof. Wallace. These must in all cases have immigrated into the south European province of the palæarctic region after the termination of the glacial period, as they belong to genera and types of tropical distribution. At the present day they occur in those countries bordering on the Mediterranean Sea.

The glacial species of butterflies—that is, the most ancient forms, designated by Prof. August Weismann, "the original stirps"—are in many cases distinguished by their melanic and melanochroic tendencies. We thus find the forms inhabiting the more northern localities and higher elevations on the mountains often of a darker hue, while their representatives in more southern latitudes and less elevated altitudes exhibit a brighter coloration. The researches of the learned German above named confirm this view, although in a few instances the reverse seems to be the case, the more austral forms exhibiting melanistic tendencies, while their representatives in boreal localities possess either a brighter or a more pallid coloration.

Without entering here into the discussion as to whether these melanic forms have been produced by the direct or indirect action of the local conditions, I think I may safely assert my belief that those belonging to the austral group owe their evolution to post-glacial times, and are consequently of much more recent origin.

The comparative paucity of the European rhopalocerous fauna is to be accounted for in two different ways. The first is that insufficient time has elapsed since the termination of the glacial period to permit of the appearance of many new species to replace those which were extirpated by the great cold. At about the climax of the glacial period, as Prof. James Geikie informs us, the land connection between Europe and Africa was severed, which resulted in the entire extinction of many species of a more austral character which were driven south, and survived for a time in the area which the Mediterranean now occupies. The second one consists in the great and insurmountable barriers to the immigration of austral forms, furnished by the elevated chain of the Himalayas and the vast sandy tract of the Sahara; otherwise, were these not existing, many oriental and ethiopian butterflies would no doubt extend the area of their distribution to the north, where they could easily find a congenial home on the shores of the Mediterranean.

As it is, on account of the absence of these austral species, the sunny South of Spain possesses fewer butterflies than Switzerland, while boreal forms exist in the latter, which are also unknown in the former locality.

At the present day the Alps, the Caucasus, and the Pyrenees constitute the richest hunting-grounds for Rhopalocera in Europe, for we here find many of the glacial species still existing, in addition to numerous post-glacial modifications in the valleys and on their southern slopes.

Birmingham, August 14th, 1895.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 217.)

Noctua sobrina, *Gn.*—Two specimens were taken at Clonbrock, Co. Galway, by the Hon. R. E. Dillon.

Noctua castanea, *Esp.*—Kilcornan (*B.*), and type and var. *neglecta* at Clonbrock (*R. E. D.*), Co. Galway. Both also occur at Markree Castle, Co. Sligo, and at Knocknarea (*R.*), but are scarce; Killarney (*B.*).

Noctua xanthographa, *Fb.*—Everywhere common and variable, grey forms predominating in many places. The var. *rufa*, Tutt, with well-marked stigmata, is not rare, and the unicolorous red form, which occurs at Castle Bellingham and about Belfast, &c. Var. *nigra*, Tutt, is occasional at Castle Bellingham, Co. Louth; Bundoran in the West (*W.*), and elsewhere.

Triphæna ianthina, *Esp.*—Everywhere distributed, and often common.

Triphæna fimbria, *L.*—Widely spread throughout Ireland, and of every grade of variation from the unicolorous pale buff forms to deep greenish-brown. Usually only an occasional species, but in some localities abundant.

Triphæna interjecta, *Hb.*—Decidedly a scarce species, though widely spread. I have taken it at Killiney and Howth, Co. Dublin; Kilcool and Arklow, Co. Wicklow; Cappagh, Co. Waterford; Minehead and Castlehaven, Co. Cork; Castle Bellingham, Co. Louth; Killynon and Cromlyn (*Mrs. B.*), Westmeath; Clonbrock, Co. Galway, two (*R. E. D.*). It sometimes flies rapidly in the afternoons in hot sunshine.

Triphæna orbona, *Hufn.* (*subsequa*, S. V., Hb.).—This has been taken in the Co. Galway as follows:—Near the town in

August, 1858 (*B.*); two at Ardrahan (*Harker*); two at Clonbrock (*R. E. D.*).

TRIPHÆNA COMES, *Hb.* (*orbona*, Fb.). — Universally common. Among its variations is one approaching the red Scotch form, but not, I think, of so deep a tint. This occurs at Howth; Sligo; Old Head of Kinsale, Co. Cork; Armagh and Coolmore, Co. Donegal (*J.*); also at Clonbrock with other remarkable forms (*R. E. D.*). The clay-coloured aberration is widely distributed and not infrequent.

TRIPHÆNA PRONUBA, *L.*—Everywhere very common, and in every grade of variation. Some of the finest of these I saw in great numbers at Toberdaly, King's Co. The var. *hœgi*, H.-S., occurs in Ireland, characterised by the apical lunule on the hind wing.

AMPHIPYRA PYRAMIDEA, *L.*—Apparently confined to the southern half of Ireland, where, as at Clonbrock, it is very abundant. But it is apparently very local. Abundant at Killarney (*B.*) and near Kenmare; and at Cappagh, Co. Waterford; not scarce about Glandore and Bandon (*L.*), Co. Cork; scarce at Moycullen, Connemara, but common elsewhere in the Co. Galway, as at Castle Taylor, &c. Athlone. It has occurred at Cromlyn rarely (*Mrs. B.*), and Killynon (*Miss R.*), where it became common in 1893. Single specimens at Howth (*G. V. H.*), and Lissadell, Co. Sligo, mark its northerly limits on the east and west coasts.

AMPHIPYRA TRAGOPOGONIS, *L.*—Everywhere common.

MANIA TYPICA, *L.*—In varying abundance in most localities.

MANIA MAURA, *L.*—Very widely spread from north to south, usually in scanty numbers. But in Kerry I have seen six at a time on the sugar; and at Castle Bellingham, Co. Louth; Corkhill, Co. Tyrone; and Castle Taylor, Co. Galway, it is also very numerous. I have not seen the pale typical form with very unicolorous ground colour in Ireland. Our specimens accord with Newman's fig. 710, with a dark median band.

PANOLIS PINIPERDA, *Panz.*—Not recorded by Birchall. A decidedly local species, probably introduced from British nurseries with fir plants, and, I think, extending its range in Ireland. There seems little doubt that the native pine tree became quite extirpated here in historical times; although extensive pine woods existed in many parts in the twelfth century, and more anciently it clothed great tracts of moor and mountain in every province; evidences of which are to be found in the lower strata of most of our bogs. The only alternative supposition seems to be that in default of fir the larva may be able to support itself on other food. Certainly the insect has been sometimes captured at great distances from any species of pine. The common form is of a bright brick-red, but specimens occur of a dull brownish tone of red, and I have taken one or two rather grey forms at Clonbrock. Localities:—Ashford, Co. Wicklow, one (*Talbot*); Agher, Co. Meath, a few (*Miss R.*); near Galway (*Lieut. Walker, R.N.*), and not scarce at Mount Bellew, and plentiful at Clonbrock in the same county. In the Co. Dublin a few at Howth (*G. V. H.*), and Tibradden one (*Halbert*); Kilderry, Co. Derry, one (*G. V. H.*); Sligo a few (*McC.*).

Pachnobia rubricosa, *Fb.*—This common British moth is rather scarce in Ireland, occurring for the most part very sparingly. The ruddy brown type seems the predominant form here, but greyer ones also occur both in the south and north. The var. *pallida*, Tutt, which seems chiefly confined to North Britain, I have taken with the type at Killarney, and Mr. McClean at Sligo; var. *rufa* also occurs at Sligo and at Clonbrock; var. *mucida*, Esp., at Kilderry, near Derry (*G. V. H.*). Localities:—Occasional specimens in Co. Wicklow (*Bw.*), and by myself at Powerscourt; Wooden Bridge (*M. F.*); Bray Head, larvæ feeding on seed-pods of wild hyacinth (*A. G. More*); Tempo Manor, Enniskillen, one (*Langham*); Farnham, Cavan; Favour Royal, Co. Tyrone. Not scarce at Markree Castle and L. Gill, Co. Sligo; and Clonbrock, and Mount Bellew, Co. Galway. At Killarney I captured once a long series on a sallow on the margin of a bog, and Mr. Hart found them abundant in a similar situation near Derry, where Mr. Campbell notes them generally as scarce. Ballycastle, Co. Antrim, abundant (*Bw.*).

Pachnobia hyperborea, *Zett.* (var. *carnica*, Hering).—A single example of this mountain insect emerged on Feb. 29th, 1893, in a cage placed in a warm sitting-room at Clonbrock, Co. Galway, and was noted in the Hon. R. E. Dillon's diary at the time as "probably *hyperborea*." He presumed it to have been the result (among others) of collecting larvæ in the preceding autumn at a large bog in the vicinity, where I find *Empetrum nigrum* grows plentifully. This part of the County Galway is flat with extensive ranges of bog, and though at only a very moderate elevation above the sea, is remarkable for preserving representatives, often in profusion, of many distinctively mountain plants.

Tæniocampa gothica, *L.*—Universally common and extremely variable. In some localities, as at Drumreaske, Co. Monaghan, and Clonbrock, specimens with red ground are numerous. At Killarney, where many northern species and varieties are found, I took a few specimens of var. *pallida*, Tutt, which may be ranked in that category. Herrich-Schäffer's var. *gothicina* (in which the black *gothica* mark is suppressed) has occurred at Killarney, Clonbrock, and elsewhere occasionally. At the latter locality a specimen of var. *suffusa*, Tutt, is worth record. Var. *rufescens*, Tutt, Westmeath, &c., rare.

TÆNIOCAMPA INCERTA, *Hufn.* — Universally distributed, but generally much less common than either the preceding or *stabilis*. The dark forms, such as var. *fuscatus*, Haw., are usually the most plentiful; and next in abundance those with warm brown ground colour. Specimens of the true var. *instabilis*, Hb., of the colour of *P. rubricosa*, with a dark band, are taken at Drumreaske, Monaghan; but it is an uncommon form. Those with various tones of grey with or without a median band are rather scarce. At Clonbrock Mr. Dillon takes a very handsome mottled bluish grey variety in some numbers, which appears referable to var. *cœrulescens*, Tutt. It appears restricted to a small area in its occurrence at Clonbrock. The var. *instabilis*, Fb. (as quoted in Tutt's 'British Noctuæ'), with greyish wings and waved ferruginous median band, I have very rarely seen. Westmeath, and Sligo (*McC.*).

TÆNIOCAMPA OPIMA, *Hb.*—A very local species, first noted in Birchall's 'Supplement,' 1873, taken by Mr. Talbot at Tarbert, on the south shore of the Shannon estuary. Many years after a specimen fell to my net at Killynon, Westmeath. Lately it has been taken pretty numerously at Clonbrock, Co. Galway; and occurs at Castle Bellingham, Co. Louth (*Thornhill*), and near Belfast (scarce, *W.*). Besides the pale grey type with median band varying in depth of colour and breadth, a considerable proportion of brown forms, with antemarginal line and outlines of stigmata paler (var. *brunnea*, Tutt), are found at Clonbrock and Castle Bellingham, some being as dark as any North of England specimens I have seen. Intermediate forms of greyish brown are not uncommon—var. *intermedia*, Tutt.

TÆNIOCAMPA POPULETI, *Fb.*—"Wicklow and Killarney" (*B.*). A *Tæniocampa* possibly referable to this species, but since lost, was taken near Derry by Mr. Campbell. Two at Clonbrock, Co. Galway (*R. E. D.*).

TÆNIOCAMPA STABILIS, *View.*—Usually the commonest of this genus, though in some districts *gothica* supersedes it. Every known variety appears to exist here, with ground colour ranging from pale whitish grey to various tones of brown and red. Often a median shading is present, and strongly marked but suffused, and many examples have the stigmata extremely large and sometimes adherent. (Var. *juncta*, Haw.) I do not know of any form peculiar to Ireland.

TÆNIOCAMPA GRACILIS, *Fb.*—This species is represented in almost every locality I have any experience of, but usually in sparing numbers. On the other hand it sometimes, as at Clonbrock, is extremely numerous, and turns up in dozens. Like *opima* it is rather later in emergence than most of its congeners, and straggles on till almost summer. The almost unicolorous creamy-white var. *pallida*, St., is, I think, the most widely distributed form; but var. *sparsus*, Haw., which is more or less speckled with black scales, is occasional in some localities,—Clonbrock; Drumreaske, Monaghan; and Favour Royal, Tyrone, &c.,—and is the local type at Enniskillen (*teste* Capt. Browne, who has also taken an extreme form of it there). Var. *pallida*, Gn. = *rosea*, Tutt, I met with at Clonbrock. The dark reddish var. *rufescens*, Ckll., is very rare; I have seen a few taken by Mr. Dillon, and one from Leenane in the same Co. (*A.*), but the colour is rarely so deep as those from the New Forest.

TÆNIOCAMPA MINIOSA, *Fb.*—The few Irish specimens hitherto taken belong to the var. *rubricosa*, Esp., being of pale reddish ground colour with a well-marked red median band. I have met with it at Howth and the Wooden Bridge, Co. Wicklow, where also Mr. Fitzgibbon took a specimen in 1892. One was recorded from Ashford, in the same county (*Talbot*, 1877). A few bred this year at Clonbrock, Co. Galway (*R. E. D.*).

TÆNIOCAMPA MUNDA, *Esp.*—The distribution of this local moth in the northern half of Ireland seems to be pretty wide; but Birchall's original record of "Killarney" is the only one yet available from the south. The range of variation seems to be as wide as in Great Britain, but I have seen none of very red ground colour. The following tints occur:—Pale grey, similar to *Xylina socia* (var. *pallida*, Tutt); dingy speckled grey (? var. *grisea*, Tutt); pale ochre (type); warm buff (? *rufa*, Tutt); dingy brown. Of these forms, with their varied designs of marking, perhaps the most striking is the last; of which I have specimens with slightly marked ante-marginal dashes, and a very broad suffused median band, and other waved transverse linear markings in darker tone. The most unicolorous example I have is of a warm buff ground, with only the reniform stigma and two almost obsolete ante-marginal dashes (var. *bimaculatus*, Haw.). The median band is usually obsolete or nearly so in the paler forms. Localities:—I have met with a few specimens at Arklow and Wooden Bridge, Co. Wicklow; Dr. Hart, one at Howth. It is not scarce at Castle Bellingham, Co. Louth (*Thornhill*); at Drumreaske, Monaghan; and on the verge of the Co. Tyrone at Favour Royal. Single examples were taken at Tempo Manor (*Langham*), near Enniskillen (near which town a series has also been caught by Capt. Browne); at Hollybrook (*Miss ff.*) and Markree Castle, Co. Sligo; Farnham, Co. Cavan (*Halbert*); and a few at Clonbrock, Co. Galway (*R. E. D.*).

(To be continued.)

NOTES AND OBSERVATIONS.

Why not collect Tortricina ?—In discussing the above question, Mr. South (*ante*, p. 215), while praising the portion of Stainton's 'Manual' allotted to this group, desiderates a new work upon it. Please allow me to extend the question to the collection of the Tineina, as well as the Tortricina, and to suggest that what is imperatively needed at this moment is a new edition of the 'Manual,' so far as it treats of these two most interesting groups, *i.e.*, vol. ii., pp. 188–439, brought up to date. A work of this kind ought not to be a difficult one. I could name many of our collectors, who are not *collectors* merely, but are well up in the scientific part of the subject, to whom it should be a "labour of love." It is probably hopeless to expect figures of every species, but a typical one of each genus might be given, or, in genera of considerable extent, several. Plain figures well lithographed would be best, though woodcuts (of the first excellence) sufficiently enlarged for the minute species, and intercalated in the text, would be perhaps most convenient. These with short Staintonian diagnoses, and differential tables of species, keeping as close as may be to Mr. Stainton's method, would be a priceless boon to collectors. The systematic arrangement might be that of Mr. South himself. This arrangement is, I believe, now generally followed and accepted by British collectors. For the greater utility of such a work I have little doubt but that almost all collectors would gladly furnish data of localities, abundance or scarcity, or any other facts that may have come within their cognizance. I trust the above suggestion may be taken up and acted upon. — (Rev.) O. P. Cambridge ; Bloxworth Rectory, August 3rd, 1895.

Polyporus for Staging Insects. — I can heartily recommend the white birch fungus (*Polyporus betulinus*), not only for staging insects, but for many other purposes as well. I first discovered this substance and used it for staging purposes nearly twenty years ago, and called attention to it in the 'Canadian Entomologist,' vol. x., page 83. I soon after learned, however, that it had long been known and used for that purpose in Germany, and it may have been in other parts of Europe. It is not for sale in this country, since so few work on the Micro-Lepidoptera here that there is not much demand for it. North America is as yet a glorious country for those suffering with the "mihi itch."— C. H. Fernald ; Amherst, Mass., August 12th, 1895.

Further Note on Acronycta psi.—With reference to my note (*ante*, p. 229) concerning the larvæ of this species, the second larva spun up (like the previous one) on the surface of the earth, on July 13th, and yesterday (20th inst.) I found that it had turned to a pupa, which seems quite healthy. I might mention that the reason for both spinning their cocoons on earth is due to there being no other convenient method, as the cage is covered by an inverted tumbler.—A. E. Allworthy ; 5, Gladsmuir Road, Whitehall Park, N., July 21st, 1895.

What Species of Insects are the most Variable ? — Were I asked this question, I should answer, *Arctia caia*, *Abraxas grossulariata*, *Cidaria russata*, *C. immanata*, *Peronea cristana*, *P. hastiana*, and *Cerostoma radiatella*, amongst the Lepidoptera ; *Coccinella variabilis*, *C. bi-*

punctata, *Donaria sericea*, and *Harpalus proteus*, amongst the Coleoptera *Ptyelus spumaria* and *Bysthoscopus flavicollis*, amongst the Homoptera *Chrysis ignita* and *Bombus muscorum*, amongst the Hymenoptera.—C. W. Dale; Glanvilles Wootton, August 1st, 1895.

Hermaphrodite of Pieris napi, var. bryoniæ.—I recently took a specimen answering this description on the Gemme Pass, in Switzerland, the right fore wing of which is that of a typical male, the other three resembling those of a female of the alpine variety *bryoniæ*. — W. Harcourt Bath; Birmingham.

Entomological Expedition to the Alps.—I have recently undertaken a very successful collecting trip to the Pennine and Bernese Alps and Jura. In the course of a fortnight I netted about 1500 specimens of Rhopalocera, representing nearly 90 species, full particulars of which I hope to publish in the 'Entomologist' later on.—W. Harcourt Bath; Birmingham, August 1st, 1895.

"Newspaper Entomology." — To a specialist of any class a newspaper will always appear inaccurate; and we cannot help feeling that Mr. James's attempt to pillory the writer of an unsigned letter to an evening paper, which any one can see for himself in a dozen public places, rather misses its mark, and recoils upon its author. Who the "moderate collector" may be I know not, but, whoever he is, he has been unfairly treated by Mr. James. The entomological mistakes referred to by the latter are, on the very face of the letter, not those of the writer, but of other parties. These mistakes are not endorsed by the writer, and it would have been foreign to the object of his letter to correct them; that object, it is plain, was the very admirable one of calling attention to the injury done by mere collectors, who can see nothing in an insect until it is skewered with a pin, and by semi-scientists, to whom an insect, like every other natural object, is simply a thing to be classified, and, once classified, of no further use. The writer's suggestion as to the protection of rare insects is not only not absurd, but interesting and useful. It would not be difficult to show that it is not unpractical. The honour of the entomological brotherhood requires that something be done to check the destruction of rare and local insects by dealers and "omnivorous" collectors, to adopt the "moderate collector's" apt description. That I may not be thought to be out of sympathy with "collecting" in a true, and, if I may apply the term that best expresses the feeling, sportsmanlike sense, I may mention that I have myself been a collector of insects as long as I can remember. I believe I began collecting before I could talk.—Harold Hodge; 2, Essex Court, Temple, E.C.

CAPTURES AND FIELD REPORTS.

Plusia moneta at Reading.—I have great pleasure in recording the capture of a fine specimen of *P. moneta*, which came to light in my house on July 14th.—H. S. Morris; 5, Southern Hill, Reading, Aug. 16th, 1895.

Plusia moneta near Tunbridge Wells.—This is the third season now I have had the pleasure of breeding this species, from the same locality each season. I have searched for it very much this year, but have not found it outside of its former haunts, which shows it is getting more restricted in habits. Some of the larvæ I found were very small. Before the first change it is a very different-looking larva, being then speckled all over with black dots, which caused me to think at first I was to be the fortunate captor of that lost species *P. illustris*, as the description of that species in Stainton's 'Manual' corresponded exactly; but after the first change it came to its normal colour. I believe this has not been noted before.—M. M. Phipps; Victoria Road, Southborough, Tunbridge Wells.

Sphinx pinastri in Suffolk.—We have taken fifteen *Sphinx pinastri* (imagos) here this year, and could have taken more. This makes the fourth year out of five we have taken them here, but for the first time we have beat the larvæ of the species, thus proving beyond all doubt that it lives and breeds here. I have about one hundred larvæ feeding now.—F. Mellusson; Rendlesham, Woodbridge, August 2nd, 1895.

Cœnonympha typhon (davus) in Delamere Forest.—I am pleased to note the discovery of three new localities in the Delamere Forest district for this interesting butterfly. In its old habitat it is evidently extinct; but, in the first of the three new localities, a fine specimen was netted on June 22nd, and several in the second on the same day. This reminded me I had marked, some miles away, last autumn, a likely-looking spot for the butterfly, and I was rewarded by taking six very fair specimens (four rather rubbed and chipped) on the 29th. The Delamere form of the butterfly belongs to the variety *philoxenus* = *rothliebi*. The eye-spots vary much in number and size; there is much variation, as well, in the whitish bars, streaks, and patches on the under surface of the wings. Underneath each lower wing there are usually, if not always, six ocelli, varying, in the case of the largest, from a tenth to the twentieth of an inch. Can any one say what is the form of *C. typhon* between the Clyde and the Forth, on the one hand, and the Cheviots, on the other? The Irish form—disregarding inconstant minor differences—seems to be the same as that in England and Wales.—J. Arkle; 2, George Street, Chester.

Colias edusa in Kent.—On July 7th I took a fine male specimen of *C. edusa* in an orchard near here, and since then have captured two others and one female.—H. W. Shepheard-Walwyn; Glensyde, Bidborough, Tunbridge Wells.

Variety of Gonopteryx (Rhodocera) rhamni.—On July 15th I took a fine male *G. rhamni* with the left primary sprinkled with orange spots.—H. W. Shepheard-Walwyn.

Periplareta americana in Kew Gardens.—I should like to record the capture of a specimen of this cockroach on April 23rd. Though common about docks in English sea-port towns, it is, at present at any rate, seldom met with inland.—W. J. Lucas; St. Mary's, Knight's Park, Kingston-on-Thames.

Capture of Mallota cristaloides, *Loew*.—On July 18th, 1880, I captured in the window of my study an Eristalid kind of large fly, which baffled all attempts to name, although I submitted it to the late Professor Westwood, Mr. Verrall, and the Natural History Museum authorities at South Kensington. However, this year I found a similar specimen in the

Museum under the above name, taken last year in the New Forest by Mr. Adams.—C. W. Dale; Glanvilles Wootton, August 1st, 1895.

Collecting at Dover.—*Colias edusa*, South Foreland meadow; one specimen reported to me; I have not seen it this year myself. *Pamphila sylvanus*, abundant. *P. linea*, about six taken. *Pieris brassicæ*, fairly common. *P. rapæ*, only two or three seen. *Satyrus ianira*, *Cœnonympha pamphilus*, and *Melanargia galatea*, very abundant on the East Cliff. *Lycæna alexis* and *L. alsus*, very sparingly; both species worn. *L. ægon*, a few; good condition. *L. corydon*, just coming out; condition fine. *L. adonis*, second brood not yet appeared. *Vanessa cardui*, one or two seen; worn. *V. urticæ*, a few hybernated and worn; this year's specimens just coming out (July 18th). *Acherontia atropos* and *Smerinthus ocellatus*, one specimen each (brought me by the boatmen: captured close to electric-lamp, Marine Parade, East Cliff). *Macroglossa stellatarum*, three or four noticed round viper's bugloss, East Cliff; captured there by others. *Zygæna filipendulæ*, swarming on downs; the earliest emerged, as far as I can tell, simultaneously with the 1st of this month. *Chærocampa porcellus*, said to occur on viper's bugloss, and has been found this season; I have not come across it myself.—F. A. Walker; 2, Eastbrook Place, Dover, July 20th.

Notes from Dorset.—Yesterday morning, on a hedge in a field here, I caught a battered specimen of *Thecla betulæ;* and later on my brother saw a butterfly, which I think was *Colias edusa*, but as it was not caught I am not quite sure; it looked rather pale, so may have been var. *helice* or *C. hyale*.—W. H. Somerset; Sydney Villa, Sherborne, Dorset, Aug. 16th.

Notes from New Forest and Epping Forest.—I have just returned home disappointed from a two days' stay at Brockenhurst. Never before have I known such an absolute dearth of moths for the time of year, beating, treacling, and dusking alike proving almost a dead failure. Rhopalocera were more plentiful, but still far below their usual numbers; *Argynnis paphia* was fairly common, and still in pretty good condition, half-a-dozen good *valesina* among them; *A. aglaia* and *A. adippe* very scarce, *Limenitis sibylla* very worn, and although *Gonopteryx rhamni* and *Vanessa polychloros* were in grand condition they were distinctly rare. The Satyridæ, which were plentiful, although not in their usual countless numbers, were principally composed of *Epinephele ianira*, *E. hyperanthus*, and *E. tithonus; Pararge egeria* was seldom seen, and *Satyrus semele* not too common. The latter species was frequently disturbed from the pine trunks in the enclosures, this being the first time I have noticed it in the New Forest away from the heathland; *Thecla quercus* was hardly out, only four specimens being seen. One *Leucania turca* and twelve other moths of the very commonest description made up the sum total of three nights' treacling, and beating went along at about the same rate. Of *Acidalia aversata*, which was undoubtedly the commonest species, I certainly did not see a dozen, and the rest could pretty well be counted up on the fingers, a male *Boarmia abietaria* and a female *Eugonia erosaria* being the only ones worth mentioning. A fair number of *Eubolia palumbaria* and one *Pseudoterpna cytisaria* from the heath, one *Ellopia fasciaria* from a pine trunk, and one *Caradrina blanda* complete the scantiest list I have ever known or heard of from the New Forest in July. The local collectors all say it is the worst season they remember. This utter failure came as a greater surprise after my experience of Epping Forest at the end of June. I spent two short evenings (June 24th and 27th) at Chingford, and if nothing very good was taken common species were swarming both at dusk and treacle. Although I had to leave each night as early as 10 o'clock, no less than twenty-nine species turned up on treacle, including three *Dicycla oo* (one of them a lovely clouded variety), *Thyatira batis*, *T. derasa*, *Xylophasia hepatica* (abundant), *Caradrina blanda*, *Rusina tenebrosa* (common), *Noctua festiva* (some very nice forms), *Aplecta nebulosa* (dark), and *Hadena thalassina* (very worn). At dusk seven *Phorodesma bajularia* were taken during a quarter of an hour on the 24th (which was all the time I had for dusking that evening), and another on the 27th; *Angerona prunaria*, males, were fairly common, *Hemithea thymiaria* and *Cidaria fulvata* abundant, and *Melanthia bicolorata* in such vast swarms as I have never before seen. On the whole, when comparing these two evenings with the two days spent at Brockenhurst three weeks later, one could scarcely imagine that it was the same season. Moreover, according to Mr. Gulliver, treacle had been no more successful in the New Forest during the last week of June (when it was so attractive in London) than I found it in July. The question of the success and non-success of treacle still seems to be far from satisfactorily settled, as the Brockenhurst evenings could not possibly have been more promising from the weather point of view, whilst the Chingford evenings were two of the brightest and clearest we have had all the summer, and at the same time there was a great quantity of "honey-dew" about on the foliage.—Russell E. James; 3, Mount View Road, Finsbury Park, N., July 22nd, 1895.

SOCIETIES.

South London Entomological and Natural History Society.—*July 11th*, 1895.—Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Fremlin exhibited a long and variable bred series of *Phorodesma smaragdaria*, Fb., all of which were set with the aid of a blowpipe; also a bred series of *Geometra papilionaria*, L. Mr. Oldham, a *Sirex gigas*, L., from Wisbech, and a number of Lepidoptera taken during the Society's field meeting at Oxshot, June 29th, including *Eurymene dolabraria*, L., *Macaria liturata*, Clerk., and *Hadena pisi*, L. Mr. Adkin, a yellow var. of *Ematurga atomaria*, L. Mr. T. W. Hall, a pupa of *Sesia sphegiformis*, Fb., and a bred series of *Eupithecia valerianata*, Hb. Mr. Edwards, a specimen of *Papilio sesostris* var. *xestos*, from S. America.

July 25th.—The President in the chair. Mr. Hall exhibited a long variable bred series of *Dianthœcia carpophaga*, Bork., the larvæ having been found on *Lychnis vespertina*; one specimen had all the usual markings nearly obliterated, and gradations led to the opposite extreme of a specimen with the markings much extended and intensified. Mr. Robson, a var. of *Smerinthus tiliæ*, L., without the usual dark band across the fore wing, and an exceedingly pretty suffused form of *Zonosoma pendularia*, Clerk. Mr. Dennis, a bred series of *Cosmia affinis*, L., from Horsley. Mr. Turner, a series of *Lycæna ægon*, Schiff., from Oxshot, showing amalgamation of spots on the under sides, blue-splashed females, and one female undistinguishable on the upper side from *L. astrarche*.

August 8th.—The President in the chair. Mr. T. W. Hall exhibited specimens of *Hadena oleracea*, L., in which the reniform and orbicular stigmata were scarcely to be traced. Mr. Adkin, a series of strongly-marked *Eupithecia tenuiata*, Hb., from Drogheda. Mr. South, a number of series of species taken near Macclesfield during the present season, including four forms of *Xylophasia rurea*, Fb.; all forms of *X. monoglypha*, L., except the very dark Durham form *Miana strigilis*, Clerk., were all dark, not a single type specimen having been seen; and two series of *Hepialus velleda*, Hb., with var. *carnus*, taken at different elevations. Mr. A. E. Hall, a specimen of *Argynnis adippe*, L., var. *cleodora*, Och., and a remarkable *Triphæna comes*, Hb., with intense black markings. Mr. Moore, a specimen of *Epinephele ianira*, L., with a considerable increase of the fulvous area; and an Orthopteron of the genus *Petasia*, from S. Africa. Mr. Frohawk, a grand series of under sides of *Epinephele hyperanthus*, L., showing all gradations from var. *arete*, Mull., to var. *lanceolata*. Mr. Turner, a var. of *Euchelia jacobææ*, L., with a small additional spot, and other Lepidoptera.—H. J. Turner, *Hon. Report. Sec.*

Birmingham Entomological Society.—*July 15th*, 1895.—Mr. P. W. Abbott, V.-P., in the chair. Mr. B. C. Bradley referred to the fungus-killed *Melanostoma scalare* shown at the last meeting; he had sent specimens to Mr. M'Lachlan, who said the fungus was *Empusa conglomerata*, a species found in America and Germany on Tipulidæ, but not hitherto found in Britain. Mr. Wainwright said he had found several lots at Sutton on grass-heads and dock-flowers, and one specimen on *Equisetum;* he had also taken specimens which developed the fungus on the way home. Mr. Martineau had observed a specimen at Bridgnorth on the wing, with the fungus well developed. Exhibits:—By Mr. Wainwright, *Therioplectes tropicus* var. *bisignatus* from Sutton, together with a specimen of the type from near Stroud. By Mr. Abbott, a number of moths from Wyre Forest at Whitsuntide—*Macroglossa bombyliformis*, *Cymatophora or*, *C. duplaris*, *C. fluctuosa*, *Acronycta ligustri*, *Tephrosia extersaria*, *Asthena blomeri*, and others. By Mr. G. H. Kenrick, *Hadena genista* from Kingswood; also *Nola cristulalis*, *Melanippe hastata*, *Macroglossa bombyliformis*, and other Lepidoptera from Coombe Wood near Coventry. By Mr. Martineau, *Chelostoma florisomne*, *Hippobosca equina*, and other insects, taken by Mr. Chase in the New Forest at Whitsuntide. By Mr. Bradley, *Helophilus transfugus* and *H. frutetorum* from Sutton Park: Mr. B. remarked the unusual abundance of the genus this year; he had taken good series of both the above, while previously he had never taken *transfugus*, and only odd *frutetorum*.—Colbran J. Wainwright, *Hon. Sec.*

Nonpareil Entomological Society.—A meeting was held on the 17th inst. at 'King John's Head,' Mansfield Street, Kingsland; Mr. T. Jackson, President, in the chair. Lepidoptera were exhibited by the following members:—Mr. W. Harper, Mr. Gurney (*Dicycla oo* from Chingford this year), Mr. Huckett, Mr. Lusby, and Mr. Jackson. Meetings of the Society are held on the first and third Thursdays in each month, at 9 p.m.

THE ENTOMOLOGIST

Vol. XXVIII.] OCTOBER, 1895. [No. 389.

OBSERVATIONS ON *PLUSIA MONETA*.

By J. C. Rickard.

In the early part of September, 1890, I found a specimen of this moth on a brick-wall (near a street lamp) in a central part of the town; since that time I saw no more of the species until May 28th of the present year, when I found one larva and three pupæ, on the following day three more pupæ, and on June 3rd another larva just beginning to spin up; seven moths emerged from these on the following dates: June 8th, 12th, 13th, 15th, 19th, 24th, and 29th; the eighth pupa dried up. On June 29th I netted one specimen, one on the 30th, and another on July 10th. I placed the one taken on June 30th with some monkshood under a glass shade, where it lived for about a week, during which time it deposited a number of ova, either singly or in groups of three or four; between thirty and forty of these hatched on July 11th, and were supplied with fresh food from time to time. Not seeing anything of the young larvæ, I made a minute search, with the result of finding five or six very small larvæ, one about a quarter and one about half an inch in length; the two larger were "oil-green" in colour, with numerous black spots (see *ante*, p. 257), superficially resembling the larva of a sawfly of the genus *Nematus* more than any larva I am acquainted with. On August 4th the largest one had formed a slight web of whitish silk between two portions of a leaf in which to undergo its last moult; on the 9th I noticed it was feeding again, but at this stage its colour was bright yellowish-green, with indistinct whitish spiracular lines, and without a trace of the black spots; at all stages of growth the larva had a considerable number of scattered hairs. On the 11th it commenced to spin, and the imago emerged on the 29th; thus passing five to ten days as ova, thirty-two days as larva, and eighteen days as pupa.

I feel almost certain that the larvæ are cannibals; excepting the one just mentioned they all disappeared; a minute search failed to discover any dead ones, and as the glass shade stood on a white cloth the smaller ones would have been easily detected, to say nothing of one a quarter of an inch long. The fact that the ova are deposited either singly or in groups of three or four, and also the fact of the half-grown larva forming a web for its protection whilst undergoing its moult, seem to be confirmatory evidence.

The cocoons are nearly as yellow as those of *Bombyx mori;* they are placed on the under side of a leaf of the food-plant without bending or warping it; the central part (that opposite the back of the caterpillar) is left open until the other parts are nearly completed, and is then closed up; the pupa remains visible owing to the thinness of the walls. When the imago emerges it does not cut or burst its way out as does *B. mori* and many other species; but there is a horizontal slit or opening at the end of the cocoon which yields to the pressure from within, and closes again when the moth has escaped, scarcely a fibre of silk being displaced, or the slightest stain visible to indicate that it has left its temporary shelter.

The imago during the day is sluggish, and will not readily use its wings; the principal points that attract attention are—its large curved palpi, its large and curiously formed thoracic crest, long legs, and the very acute angle made by the wings in repose.

The species is double-brooded, but the only example of the second brood that I know to have been taken in the wild state is the one mentioned above as caught by myself in September, 1890. Mr. Mathew and Mr. Phipps seem to have reared and perhaps taken specimens of the second brood, and, as just noted, I had one emerge from the pupa on August 29th. Of those of which I have notes of capture, one was taken in May, thirteen in June, nineteen in July, and one in September.

So far as is known at present, the distribution of *P. moneta* in Great Britain is strictly confined to the south-easterly part of England, the neighbourhood of Tunbridge Wells being its head-quarters. In Kent 16 have been procured, and many others bred or captured by Mr. Mathew and Mr. Phipps; Surrey, 8; Sussex, 1; Hampshire, 2; Berkshire, 4; Middlesex, 2; Cambridge, 13; Norfolk, 1; total 47. There does not appear to be any recorded from Essex, Suffolk, or Hertfordshire, which leaves a rather large gap between Norfolk and Cambridge localities and the more southern counties.

Halifax Road, Cambridge.

PRODUCTIVENESS OF *COLIAS EDUSA*.

By F. W. Frohawk, F.E.S.

On August 25th last I captured a fine and apparently freshly-emerged female of *C. edusa*, which I at once boxed alive for the purpose of obtaining ova. The following notes of the deposition of the ova may be of interest.

The next morning (August 26th) I fed the female with sugar and water, and confined her on a growing plant of clover; but the entire day was so dull, without a single gleam of sunshine, that she remained motionless the whole time. 27th.—Dull until 4 p.m., when the sun began to shine, which at once caused the butterfly to become very lively, and she deposited a few eggs. 28th.—A bright sunny morning; she was early on the move and busy depositing; by 9 a.m., when I again fed her, I found about 30 eggs were laid; the day remaining hot and sunny, she had by the evening deposited about 100 eggs. 29th.—I placed her upon a fresh plant; during the day between 70 and 80 more eggs were laid. 30th.—Fed her again; after a good feed and the hot bright weather she was induced to deposit between 50 and 60 more eggs during the day. 31st.—Fed again, and put her on another plant, and 50 more were laid.

Sept. 1st.—Fed again, and she produced 50 more eggs. 2nd.—Another big drink at the sugar and water, and another lot of 80 eggs were deposited. 3rd.—She was again supplied with a fresh plant and a feed, and the new addition of eggs again reached 50. 4th.—Fed again, and another lot of 24 eggs were laid. 5th.—She died without further depositing; when I opened the abdomen I found it quite empty; not a single egg remained.

Therefore, from the fresh condition of the specimen when captured, she had in all probability not commenced depositing; so that undoubtedly the full complement, numbering at least 480, were laid in confinement. I think 500 would be nearer the total number laid, as I am certain many were hidden from view at the time of counting each lot of eggs on their respective plants; I counted them each morning and evening; those of the previous day, having changed colour from whitish to pink, readily denoted the day of deposition.

The larvæ commenced hatching Sept. 3rd, remaining only seven days in the egg state, the short duration being influenced by the hot sunny weather since the 27th August. They are now feeding, and many are in the second stage.

All the eggs proved fertile, showing that one pairing is sufficient to fertilize the entire number of ova of this species, which is undoubtedly all that is necessary in most species.

Balham, S.W., Sept. 14th, 1895.

SUGAR *versus* NATURAL FOOD.

By F. C. Woodforde.

This season has been in this neighbourhood an unusually good one for sugar; and also, I think, a very instructive one with respect to the amount of attraction sugar has for moths. Ever since the end of the great frost of February and the early part of March, moths have been unusually abundant. In the third week of March *Hybernia leucophæaria* and *Phigalia pedaria* were most abundant; and I succeeded in taking between twenty and thirty *Nyssia hispidaria*, seven being females, on the trunks of trees. The sallows were fairly productive, but the weather during the season of their bloom was frequently unsuitable. At the end of April, while hunting for pupæ of *Sesia culiciformis* in birch stumps, I came across two pupæ of *S. sphegiformis*, but both died before the time of emerging. The larvæ of *Aplecta tincta* were very abundant during April on the birches, and one evening I collected over seventy in less than an hour and a half.

During May Geometers were abundant; and on May 28th I tried sugar for the first time, taking *Dipterygia scabriuscula* (1), *Thyatira batis* (1), *Hadena thalassina*, and *Acronycta rumicis*. An account of our success at sugar on June 1st, 3rd, and 4th, written by my friend Mr. E. W. H. Blagg, appeared in the July number of the 'Entomologist.' During Whit-week the weather was very warm, with occasionally heavy showers of rain, and sugared trees were literally covered with moths; but on Monday, June 10th, a cold spell set in, with almost frosty nights, and, as a matter of course, nothing appeared on the sugar at all. The change was most striking, after the swarms of the previous week. The week commencing June 16th was warm and fine, and I started on Monday night in full hope of filling my boxes, but to my surprise hardly a moth came to sugar. They were flying about in swarms, but the sugar seemed to have lost all its attraction. Some clumps of seedling aspens, from three to four feet high, seemed a favourite haunt; and on examining them the next day I found the upper surface of the leaves covered with honey-dew. There was no aphis this year, and these seedlings were in the open, not exposed to droppings from higher trees. Aphis of course is one great source of honey-dew, but could not be the source in this case. I cannot help thinking that the cold nights of the previous week had injured the delicate cuticle of the young leaves, and that the sap had exuded through the injured surface, thus forming what is called honey-dew, and providing natural food for the insects. The oaks seemed not much affected, and their leaves were almost entirely free from exudation, though few of the younger leaves had in places a little on them. All through the week it was the same; with fine days and warm nights not a moth came to sugar. At flowers in the garden *Plusia iota*, *P. pulchrina*, *P. chrysitis*, *Dianthœcia capsincola*, and *Cucullia umbratica* were numerous, and one *P. festucæ* was taken; while *A. tincta* and others were abundant, flying over the aspens in the wood.

This state of things lasted till the 27th, when heavy showers again fell, which washed all the honey-dew off the leaves. On the 28th I tried sugar again, and moths swarmed at it:—*A. tincta* (some fresh, others very worn), *A. herbida* (quite fresh), *Acronycta leporina* (2), *Hadena gemina*, *Agrotis exclamationis*, *Leucania comma*, *Acronycta rumicis*, *Noctua augur*, and *N. triangulum* (3). This was repeated on the 29th. Then after three or four dry days the honey-dew again appeared, and sugar became useless. And so this has gone on up to the middle of August. After rain sugar has been most attractive, while two or three dry days have rendered it again almost useless. *Orthosia suspecta* swarmed in July on good nights; *Cleoceris viminalis*, abundant (some very dark); *Miana strigilis* var. *æthiops* and *Apamea didyma* (mostly dark brown or black), swarming; a few *Hydrœcia nictitans* and *Triphæna fimbria*; and on two very still, dark nights fourteen and eighteen *Hypenodes costæstrigalis*, respectively, were taken.

During August, up to the 19th, *Noctua neglecta*, *N. dahlii*, *Calocampa solidaginis*, and *T. fimbria* were numerous at sugar, with an occasional *H. costæstrigalis*; but after the 21st, although *C. solidaginis* was fairly numerous, the others left off coming. The ling had then come into bloom, and during the rest of the month all the above, except *T. fimbria* and *H. costæstrigalis*, were to be found on the ling flowers, with, in addition, a few *N. glareosa*. On many nights in July and August from 70 to 100 moths on a tree was a by no means uncommon sight. I could not observe that fruit essences at all increased the attractiveness of the treacle, and I found methylated spirit quite as effective as rum.

Natural food has been scarce this season. There has been no aphis, for one thing; and, for another, the honey season has been very bad here. In spite of the fine hot weather of May and June, the bees have collected very little honey, and are now feeding greedily on fallen fruits, and are visiting the fruiterers' shops in swarms.

The conclusion I arrive at, then, is that moths have no very great predilection for sugar, and only come to it when natural food is scarce; and of course only then when the weather is favourable, cold or damp being fatal to success.

Honey-dew seems to be of all things the favourite food; and if a chemist could manage to produce in large quantities, at a reasonable price, an artificial substance resembling it more closely than do sugar or treacle, he, as well as collectors, would probably find it highly profitable.

Market Drayton, September 12th, 1895.

NOTES ON THE LEPIDOPTERA OF THE MACCLESFIELD DISTRICT.

By Richard South.

The investigations I have been able to make into the lepidopterous fauna of the country around the ancient borough of Macclesfield, in the county of Cheshire (elevation 500 feet), have not so far been of a very satisfactory character. Probably the generally unfavourable state of the weather during the fourteen months I have resided here has been the primary cause of the very poor collection made. I am sure that under more suitable circumstances, especially as regards meteorological conditions, some of the localities visited would yield a larger number of species, to say nothing of specimens, than I have yet had the fortune to obtain in them.

I especially expected to have made some good captures on Danes Moss. This is a tract of boggy land situated about a mile south of the town, and, although of somewhat limited area now, was once of considerable extent. At the present time by far the larger portion of it has been reclaimed and is under grass, cereals, or vegetables, principally the first. Still there remains an abundant space of original moss-land to nurture and harbour those species of Lepidoptera which usually flourish in such situations. Although extensively drained by trenches, and consequently less boggy perhaps than formerly, the flora of the present day is probably very little altered from what it was centuries ago. On the drier parts there is a quantity of heather with a little bilberry, and in other parts the cotton-grass grows in great luxuriance. Cranberry is not uncommon in several places, there is a liberal sprinkling of bog-myrtle here and there, and a plentiful growth of bushy sallow and birch.

The moorlands are extensive but somewhat distant. The nearest is about eight miles, and all uphill to get there, as it lies at an elevation of about 1700 feet. An unpleasant feature of collecting on these moors is that rain often falls there, even when the weather at lower elevations is fair. I have only worked two localities on the moors. One of these is beyond the 'Cat and Fiddle,' an inn noted as being the highest licensed house in England; the other is called 'Ludchurch.' The first is partly in Cheshire and partly in Derbyshire, and the other is in ffordshire. The latter has been found the most productive in insects, as it also is the most interesting both for its natural charms and the legends associated with it. I have visited each of these places several times, but the weather has always been more or less unfavourable for collecting.

Of woods there are none within some six or seven miles, but as all the hedgerows both of lanes and fields are thickly studded with timber trees of all kinds, there is no lack of pabulum for the larvæ of those species of Lepidoptera that feed on, say, alder, beech, birch, elm (wych), oak, poplar, &c. Cocks Moss is one of several adjoining long narrow strips of woodland lying to the south of the town. These are rigidly preserved, and the entomologist, not being understood in these parts, is considered as something pretty low down in the poaching line of business, and does not meet with favour from the gentlemen in velveteen. At the certain risk of being summarily ejected if seen, I have been several times to these woodlets in the hope of meeting with *Dicranura bicuspis* in one or other of its stages, but I have not succeeded in detecting any trace whatever of this species. There is an abundance of alder in all stages of growth, and the locality altogether seemed to me to be just the spot for the "kitten."

A former collector of British Lepidoptera, now living in this town, but who previously resided at Congleton, a town about eight miles further south, informs me that several of the Argynnidæ and other butterflies used to occur along the Dane Valley. I have not been often to this valley, charming locality though it is, because my attention has been chiefly bestowed on moss and moor. On the occasions, however, when I did give myself the pleasure of an excursion up the valley of the river Dane, I failed to see any other butterflies than the three common Pierids and *Cœnonympha pamphilus*. In fact those species, with the addition of one specimen of *Melitæa aurinia* (= *artemis*), which settled on my lawn, and whose headquarters I could not discover, a few *Chrysophanus phlœas*, and larvæ of *Vanessa atalanta*, are all I am able to chronicle with certainty as butterflies occurring in the district around Macclesfield. There seems to be little doubt that *Cœnonympha typhon* (= *davus*) did exist on Danes Moss, but I am not sure that it occurs there still, although I got a glimpse of a butterfly last year which I fancied at the time was this species. It is also reported to occur on the 'Cat and Fiddle' moor, but I have not seen it there.

The only representative of the Sesiidæ that I have met with is an example of *Trochilium crabroniformis*, which I found at rest on osier on the Moss. I have seen this species at rest in a state of nature more than once, but am always in doubt, for the moment, as to whether the insect is lepidopterous or hymenopterous. Its resemblance to a hornet is much more striking when reposing on a leaf or twig, than when set out as a cabinet specimen. Two or three non-entomological friends to whom I showed the insect whilst alive declared it to be a hornet, and ridiculed my assertion that it was a harmless moth; but one individual, more observant than the others, detected a difference in what he termed the horns.

Of the "hawk moths" I have seen but one species, *Smerinthus populi*. A specimen was brought to me as a great curiosity by a man who seemed to be well acquainted with the insect in its larval state, but he could not understand at first how the winged moth could in any way be associated with the creeping thing. However, the little information I was able to impart so interested him that he determined that in future he would feed and watch all "bots" that he met with, to see what kind of "buzzards" they would produce.

Very few Bombyces have been observed. *Nudaria mundana* occurred sparingly on the old walls, which are built up of stones without mortar, and are a feature of the country on the east of the town; the larvæ of this species were looked for in their season, but could not be found. One or two larvæ of *Spilosoma fuliginosa* were picked up on the Moss in the autumn of 1894, and these produced imagines in May this year. *Hepialus humuli* and *H. velleda* were both common. Series of the last-named were taken on the edge of the Moss, and among grass on the margin of one of the pools above Langley. The latter locality is about a mile and a half, as the crow flies, from the Moss, and something like 200 feet higher. The average size of the Moss specimens is less than that of the Langley examples, and the former are rather brighter. The unicolorous variety (*gallicus*) occurred in both places, but was more frequently taken by the pool. It was noticed each evening that *velleda* ceased flying soon after *humuli* appeared on the wing. Only one specimen of *H. lupulinus* was observed, and this occurred in the garden here. Two female specimens of *Saturnia pavonia* (=*carpini*) were bred last spring, and these were taken on three occasions to the Moss where they had lived as larvæ the previous autumn, but they only attracted half a dozen suitors altogether. After the last male taken had been in the cyanide-bottle a little while, it occurred to me that I ought to have obtained a batch of fertile eggs, so I quickly transferred H. I. M. from the bottle to a gauze-covered box, but he seemed quite dead. However, about half an hour or so afterwards I found him buzzing around right merrily. When I reached home I placed the male and one of the females in a roomy gauze-covered box. Next day a small cluster of eggs was seen, and more the following day. The majority of these shrivelled, but about a score of larvæ hatched out from the remainder, and these fed up well and are now (July 20th) about to spin their cocoons. Young larvæ of *Asphalia flavicornis* have been not uncommon, but examples of mature growth were rarely served. They seem to be pecked out of their chambers, and devoured by birds when about half grown.

Four species only of Noctuæ have been really common; these are *Xylophasia monoglypha* (=*polyodon*), *Miana fasciuncula*, *Noctua augur*, and *Triphæna pronuba*; on several occasions they were the only moths that visited the sugar at all. The walls of the district have frequently been examined for *Bryophila perla*, but not a specimen could be found thereon; in August last year one example was found on the bare ground at Ludchurch, and attention was then given to the rocks there, but no other specimen was seen. In September these walls produce *Polia chi* in some numbers, but the olive-grey form does not seem to occur. A number of the larvæ of *Acronycta menyanthidis* were collected, principally from sallow on the Moss, but only about five per cent. of these attained the perfect state, although they all pupated satisfactorily. The pupæ were kept indoors; probably it would have been better to have left them in the garden, where the larvæ had been kept. All the examples are pale in colour, but some have broad dark borders to fore wings. *Leucania impura* and *L. pallens* were the sole representatives of the genus noticed in the district. The last-named was most abundant, and a good proportion of the specimens seen were of the reddish form (var. *rufescens*). Four distinct forms of *Xylophasia rurea* occur here in the garden, *i. e.*, the type; a form with rather silvery ground and fewer markings than the type; and two unicolorous forms, in one of which the colour is reddish-brown, and in the other blackish-brown. This species did not come freely to sugar; most of the examples taken were netted. As previously mentioned, *X. monoglypha* occurs commonly, but it is rather surprising that none of the specimens show any tendency towards melanism, seeing that black forms of some other species, presently to be referred to, are found here. Of *Apamea didyma* (=*oculea*) the majority of the specimens are unicolorous brown or greyish-brown in colour (var. *nictitans*), and only two of the white-spotted black form (var. *leucostigma*) have occurred. Last year *Miana arcuosa* was pretty common, but very few specimens have been seen here this year. This species occurs in a field adjoining my garden.

In 1894 I saw a good number of *Celæna haworthii* flying over the heather on the Moss, but they were difficult to capture. Sugar did not seem to have any attraction for them. They flew most freely about an hour before dusk. I examined heather-bloom with a lamp, but without result so far as concerns this species. I have not seen it this year. Only one specimen of *Grammesia trigrammica* (=*trilinea*) has been noticed, and this was an example of the var. *bilinea*. One *Noctua glareosa* was found at rest on the ground among heather in the wood at the back of the 'Wizard Inn,' Alderley Edge. Only one example of *N. brunnea* has been seen, and this came to sugar on the edge of the Moss, as also did about a dozen specimens of *N. festiva;* but most of the latter were in poor condition and of the small form generally referred to as var. *conflua.* *Triphæna pronuba* has been very abundant this year and exceedingly variable, but very few *T. comes* (=*orbona*) have been seen. An example of *Orthosia suspecta* was found at rest on the trunk of an oak-tree at Alderley, but this species, like *N. glareosa,* did not seem to care for sugar. Larvæ of *Xanthia fulvago* (=*cerago*) were common in sallow-catkins on the Moss, and produced var. *flavescens* in the proportion of 1 in 20. A few *Dianthœcia capsincola* were bred from larvæ feeding in seed-capsules of sweet-william. A number of larvæ of *Cleoceris viminalis* were collected on the Moss, but only four imagines were bred from them; these are of a leaden colour. Half a dozen larvæ of *Agriopis aprilina* were found on oak-trunks at Bollington, a place about three or four miles from here. *Phlogophora meticulosa* was rather common last autumn, and several of the specimens taken have rosy-brown markings instead of the more usual olive-brown. *Hadena adusta, H. trifolii,* and *H. oleracea* have all been more or less scarce, but of the latter there are now a number of larvæ about. A nice series of darkish specimens of *H. thalassina* were bred in June this year from a batch of eggs found on a twig of sallow in the beginning of July, 1894; a few examples of the species were seen at sugar. *Plusia bractea* has been not uncommon in the district in years gone by. I am told that a collector living in the town some thirty or forty years ago used to take from 12 to 20 specimens in an evening at the flowers of honeysuckle. I have visited the actual spot where he used to work, but neither there nor elsewhere have I had the fortune to meet with this pretty insect. There are sundry odd examples of *P. bractea* in various cases of insects about the town, but the condition of every one of them is very shocking.

Among the Geometræ observed in this district the most abundant was *Rumia luteolata* (=*cratægata*). Only two specimens of *Uropteryx sambucaria* have been seen, and both are below the average size. I was unable to search for *Phigalia pedaria* (=*pilosaria*) at the time this species was out, but a very black female was found on an apple-tree in a neighbour's garden, and from a batch of ova which she deposited I now have a number of pupa, which I hope may produce some dark male specimens next year. From a larva of *Amphidasys betularia* obtained in September, 1894, an example of the black variety (*doubledayaria*) was reared this year; this is the only specimen of the species that I have met with here. Two larvæ of *Geometra papilionaria* were beaten from birch at Cocks Moss. *Acidalia subsericeata* occurs in one or two places around here, but it does not seem to be common. Of *Abraxas grossulariata,* I have only seen four or five specimens, and these were very ordinary. *Larentia* *ata* occurs on the moor at Ludchurch, but was most frequently obtained from walls in the lanes below the moor. Although an abundance of its food-plant, yellow rattle, grows in most meadows here, I have not seen *Emmelesia albulata* within two miles of the town. *E. alchemillata* has been scarce, and *E. decolorata* not common. One very fresh specimen of *Eupithecia venosata* was taken in a lane near my house, but I could not find any more of this species. *E. pulchellata* appears to be not uncommon, especially in the lanes in June; larvæ were found in July. Larvæ of *E. subfulvata* are not scarce or difficult to find in September feeding on yarrow growing on hedge-banks; the partly devoured foliage indicate the presence of the larva. *E. castagata*, *E. nanata*, *E. vulgata* all appear to be scarce, and *E. minutata*, which occurs on the Moss, is not common. *Hypsipetes trifasciata* (= *impluviata*) seems to be very scarce; a few larvæ were found in 1894, but only one imago resulted from them, and it was crippled. *H. sordidata* (= *elutata*) has been very abundant in the larval stage on bilberry, but only a few were found on sallow; two or three were found on bog-myrtle (*Myrica gale*). The moths from the bilberry larvæ are very interesting, the majority being very dark in coloration, several indeed entirely fuliginous. Among the green forms many of the specimens have this colour very bright and arranged in fine transverse lines. *Melanippe montanata* has been pretty common; all the specimens examined were of a clear white, with few markings beyond the central fascia, which was generally well defined and sometimes almost black in colour. Two specimens of *M. galiata* were found on the hills sitting on a wall. *M. fluctuata* does not exhibit anything striking in the way of variation. *Cabera pusaria* has been generally common among alder. In the specimens occurring at Cocks Moss all the lines are strongly marked, and in one example captured they are broader than usual. *Coremia designata* (= *propugnata*), *C. ferrugata*, and *C. unidentaria* were each represented by a solitary specimen. *Camptogramma bilineata* has not been very common. *Cidaria miata*, *C. immanata*, and *C. populata* all appear to be pretty abundant, and some specimens of the second species have the central fascia grey, and are quite different from any form that I have met with before; *C. suffumata* does not seem to occur in the unicolorous form in this district. *Cidaria fulvata* has not been seen in any numbers, but appears to be out a long time. *C. dotata* (= *pyraliata*) has been met with occasionally. *Tanagra atrata* (= *chærophyllata*) is very common in one or two localities in the district, but especially so around the margins of the pool at Langley.

(To be continued.)

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 254.)

Tæniocampa pulverulenta, *Esp.* — A considerable interest attaches to this species from a distributional point of view, and it would be well that its life-history and peculiarities should be studied, with the view of elucidating the anomaly it presents; the experience of British and Irish collectors being vastly different. Though numerous almost everywhere across the water (*teste* Newman and Stainton), it is here local and usually scarce. For many years I collected Tæniocampidæ in Ireland without meeting any but single specimens of *pulverulenta*. At Killarney I found five at a particular sallow, but during the ensuing fortnight, over a wide district about the Upper Lake, I made no further capture of it, though other species were numerous. It is plentiful in Co. Wicklow, from Arklow to Wooden Bridge, the type of dark warm grey, and ab. *nana*, Haw. (pale grey) and ab. *pusillus* being represented. At Clonbrock, Co. Galway, it is also very abundant, though apparently absent at Mount Bellew and Ardrahan in the same county. The Clonbrock specimens offer a certain amount of variation, some being profusely powdered with red scales, while others are characterised by well-developed series of spots and strongly-marked stigmata. Other localities are Co. Wicklow, Powerscourt, one; Ashford, a few; but about Shillelagh Mr. Bristow never met with it; Phœnix Park, a few; Sligo, two (*Tutt*); near Kenmare, a few, Co. Kerry; none recorded from the Belfast district by Messrs. Bristow and Watts; nor have I taken it in Co. Tyrone or Monaghan.

Orthosia suspecta, *Hb.*—The late Mr. F. Bond showed me some very lovely forms of this species, taken at Killarney by Bouchard. Recorded on somewhat doubtful evidence by the late Mr. Sinclair from the Co. Londonderry. Co. Wicklow (*B.*).

[*Orthosia fissipuncta*, Haw., *Ypsilon*, Bork.—Recorded by Birchall, probably on insufficient authority, from Co. Wicklow.]

Orthosia lota, *Clerck.*—Widely distributed, but somewhat local. The red form is the more prevalent one, but near Sligo (*Russ* and *McC.*) dark grey specimens are also not uncommon, some examples assuming a very dark leaden hue.

Var. *suffusa*, Tutt. Co. Dublin, and Ashford, Co. Wicklow, not rare; Cappagh, Co. Waterford, rare; Killarney, Tarbert, scarce.

Var. *rufa*.—Clonbrock and elsewhere in Galway, fairly abundant; L. Gill and Markree Castle, Co. Sligo, not common;

Farnham, Co. Cavan, scarce; Tullamore, King's Co., scarce; Killynon and Cromlyn, Co. Westmeath, fairly numerous; rather rare at Belfast (*W.*); Derry (*C.*); Castle Bellingham (*Thornhill*); Drumreaske and Favour Royal, Co. Tyrone.

ORTHOSIA MACILENTA, *Hb.*—Generally distributed, and often abundant. The pale straw-coloured form is somewhat scarce. Examples of either colour have the stigmatal blotch obsolete. Hazlewood and Markree, Co. Sligo, numerous; and at Cromlyn (*Mr. B.*); Killynon, Co. Westmeath; Favour Royal, Tyrone; Farnham, Cavan; Derry (*C.*); Tullamore; Cappagh, Co. Waterford; Killarney; Ashford, &c., Co. Wicklow; and Co. Dublin.

ANCHOCELIS HELVOLA, *L.* (*rufina*, L.).—This, like *Tæniocampa pulverulenta*, is one of the distributional anomalies of our Irish fauna. This common British moth is decidedly rare in Ireland, although Mr. Birchall, probably by some confusion of memory between his English and Irish captures, recorded otherwise. The few specimens I know of are of the dull red inconspicuously banded form. One at Clonbrock (*R.E.D.*); Armagh (*I.*); and Ashford, Co. Wicklow; three at Cappagh, Co. Waterford (*Miss V.*).

ANCHOCELIS PISTACINA, *Fb.* — Common and widely spread. Variable, from clear pale greyish brown, or ochreous grey, to brick-red ground colour, the markings presenting every stage of obsolescence, the ab. *ferrea*, Haw., being sometimes met with quite unicolorous. The latter is somewhat localised in Ireland. Other aberrations met with are *serena*, Esp.; *sphærulatina*, Haw.; *lineola*, Haw.; and *venosa*, Haw.

ANCHOCELIS LUNOSA, *Haw.*—Widely distributed, but most abundant on the sea-coast. It is one of the most variable of the Orthosiidæ, and all the known forms are represented in Ireland, the ab. *agrotoïdes*, Gn., being sometimes extremely black, with very pale nervures. A strikingly fine form, not rare on the S.W. coast, Saltee Islands, &c.

ANCHOCELIS LITURA *L.*—Three specimens at Clonbrock, Co. Galway (*R.E.D.*).

CERASTIS VACCINII, *L.*—Universally distributed and common. The mahogany-coloured type with dark shading in the reniform stigma, and the chestnut form with distinct waved lines and dots are both common. The deep-mahogany unicolorous form, *unicolor*, Tutt, is also not rare.

CERASTIS LIGULA, *Esp.* (*spadicea*, Hb.)—A rare Irish species.

Var. *subnigra*, Haw., marked with antemarginal pale band; and var. *spadicea*, Haw., are both represented in Ireland. Localities:—Killarney, four; very scarce at Favour Royal, Tyrone; Farnham, Cavan; and Belfast (*W.*). (Co. Wicklow was recorded in mistake by Mr. Birchall, but it probably occurs there.)

Cerastis erythrocephala, *Fb.*—The Hon. R. E. Dillon took two examples at ivy on the same evening of a peculiar form of this species, redder than var. *glabra*, Hb., and intermediate between it and the type.

Scopelosoma satellitia, *L.*—Generally very common, but somewhat uncertain in distribution. Varies as in Great Britain.

Dasycampa rubiginea, *Fb.*—Taken by Birchall at Dublin, Tullamore, and Killarney; Devil's Glen, Co. Wicklow; one near Galway (*R. E. D.*).

Oporina croceago, *Fb.*—One specimen bred from a larva taken at Clonbrock (*R. E. D.*).

Xanthia citrago, *L.*—Co. Wicklow (*B.*); two at Clonbrock, Co. Galway (*R. E. D.*).

Xanthia fulvago, *L.*—Probably widely distributed, but less frequent than the following species. I have not taken the var. *gilvago*, Haw. (*flavescens*, Esp.); but the intermediate aberrations with more or less obsolete markings are occasionally found. Co. Wicklow, abundant (*B.*), Powerscourt; Kilderry and near Derry, abundant (*C.*); Enniskillen, abundant (*Col. Partridge*); Armagh (*J.*); Castle Bellingham, one (*Thornhill*); Belfast, scarce (*W.*); Killarney, abundant; Markree, Co. Sligo, &c.

Xanthia flavago, *Fb.*—Found in most localities, and not scarce. Ashford, Powerscourt, Kilcool, and Greystones, Co. Wicklow; Glengarriff, Killarney, and Sneem, Co. Kerry; Cappagh, Co. Waterford; Hollybrook, Markree, Lissadell, and L. Gill, Co. Sligo; Clonbrock, Co. Galway (*R. E. D.*); Derry (*C.*); and Mishowen (*G. V. H.*), Belfast; Favour Royal, and Drumreaske, Monaghan; Armagh (*J.*); Enniskillen (*S.*); Killynon (*Miss R.*); Cromlyn (*Mrs. B.*); Westmeath.

Xanthia aurago, *Fb.*—Birchall notes that it was reported as taken by a Mr. Haughton, but no locality recorded. One at Clonbrock (*R. E. D.*).

Xanthia gilvago, *Esp.* — One at Clonbrock, Co. Galway (*R. E. D.*).

Xanthia circellaris, *Hufn.*—Everywhere very abundant. Irish examples usually seem less strongly marked, and paler than the form I am familiar with in the South of England, which have the pattern of waved strigæ, &c., distinctly represented.

(To be continued.)

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By Arthur G. Butler, Ph.D., F.L.S., &c.

(Continued from p. 227.)

Azeta, *Guen.*

M. Guenée confounded two genera under *Azeta*, represented by *A. uncas* and *A. rampoa;* the former will have to stand as the type, because *A. rampoa*, *rhodogaster*, and *mirzah* (his other three species) are synonymous, and identical also with the type of Walker's genus *Chabora*. *Azeta* differs from *Chabora* in the female (the male of *A. uncas* is, at present, unknown to me) having more evidently ciliated antennæ, a decidedly longer third joint to the palpi, more hairy legs, with stouter spurs, and with decidedly shorter discoidal cells to the wings.

Azeta uncas.

Azeta uncas, Guenée, Noct. 3, p. 359, n. 1833 (1852).
Hypernaria (sic) *continuens*, Walker, Lep. Het. xv. p. 1614, n. 2 (1858).
West Indies; Jamaica. In Coll. B. M.

Chabora, *Walk.*

Chabora repugnalis.

♂ *Pangrapta repugnalis*, Hübner, Samml. Exot. Schmett. Zutr. (drittes hundert) p. 37, n. 288, figs. 575, 576 (1825).
♀ *Azeta rampoa*, Guenée, Noct. 3, p. 360, n. 1834 (1852).
♂ *A. rhodogaster*, Guenée, *l. c.*, n. 1835 (1852).
♀ *A. mirzah*, Guenée, *l. c.*, n. 1836 (1852).
Thermesia fusilinea, Walker, Lep. Het. xv. p. 1564, n. 6 (1858).
Chabora undulifera, Walker, *l. c.*, Suppl. 3, p. 114 (1865).
Thyridospila? suffusa, Walker, *l. c.*, Suppl. 5, p. 1970 (1866).
Jamaica, St. Domingo, Venezuela, Pará, Rio Janeiro. In Coll. B. M.

Chamyna, *Hübn.*

Chamyna ceramina.

♂, ♀ *Chamyna ceramina*, Hübner, Samml. Exot. Schmett. 2, pl. 205, figs. 1-4 (1806).
♀ *Hypernaria* (sic) *metaspila*, Walker, Lep. Het. Suppl. 3, p. 1087 (1865).
Venezuela and Ega. In Coll. B. M.

Chamyna sera.

♀ *Plaxia sera*, Walker, Lep. Het. xv. p. 1628, n. 8 (1858).
♂ *Thermesia imbuta*, Walker, Char. Undescr. Lep. p. 56, n. 94 (1869).
Honduras, Limas. Types in Coll. B. M.

The genus *Plaxia* will, I think, have to be restricted to its type *P. macarea*. The species figured by Felder under the name of *Apistis* (*Argidia*) *mormon* is, in my opinion, a New World representative of the genus *Emmonodia*, with which it corresponds in general pattern, the coloration of the body, and in the structure of the legs; the densely hairy hind legs are very similar to those of *Emmonodia pudens*, but quite unlike the legs of *Apistis* and allied genera; the antennæ are pectinated in the male, and the palpi are markedly longer than in *Emmonodia*, so that it will have to be a distinct genus.

In the so-called families Amphigoniidæ and Focillidæ there are various distinct types belonging to the Dysgoniidæ, Thermesiidæ, and Hypenidæ respectively, whilst the following are allied to *Ischyja* and *Platyja*.

Phagytra, *Walk.* = Masca, *Walk.*

Placed by Walker in the heterogeneous group Platydidæ. The typical species *P. leucogastralis* is widely distributed, our examples having been received from Java and Ceram. The type of *M. abactalis* is from Singapore.

(To be continued.)

NOTES AND OBSERVATIONS.

Note on the Earlier Larval Life of Stauropus fagi.—Thanks to Mr. Barnes, of Reading, who most kindly sent me a living female of *Stauropus fagi* (of the melanic type), which he had found on May 20th in the birch-woods in his district, I have been enabled to closely study the earlier life of this larva.

I kept the moth alive for seven days, during which time she deposited a few ova each night: these were scattered on some oak-leaves I had placed in with her. All told, she produced for me forty eggs; and she was then quite exhausted, so that doubtless she had previously deposited a good many ova. The last six laid proved infertile, or so weak that, although they changed colour, they failed to hatch. The eggs when first laid are of a pale cream-colour, in shape hemispherical, fattened beneath. About the seventh day a circular depression and a dark spot appear, and gradually a dull purple colour pervades the whole area. On the tenth day the larvæ hatch out. The larvæ when first they leave the shell appear unusually large; this is partly on account of the very curiously long legs and the two caudal appendages, which are ever nervously twisting about. The young larvæ most carefully keep guard over their own egg-shell, which is to them an all-important item, as this provides them with their first meal—their first and the only food they take for seven days, in fact for a longer period, as it is not until after moulting their first skin that they eat any other food. This fact I proved over and over again, as, being an invalid, my time was quite free to watch them hour after hour and day after day. As soon as they have eaten their way out of the shell they stretch themselves, and then from time to time nibble portions of the white chitinous-looking egg-shell, and a tough morsel it seems to be for them; but they never leave it for more than an inch or so, when they rapidly come back. They keep nervously moving round and about this, and if perchance another larva should approach within touch of it, a vigorous attack is made to drive off the intruder. All going well during the first hour or two, the whole of the shell, or sometimes not more than from half to two-thirds of it, is consumed; and once the larva really leaves the egg-shell, that is, walks away from it, they do not touch it after. If by any chance a young larva gets driven away from the egg-shell, death is the certain result, as I could never induce them to feed on portions of empty shell left by others; nor would they eat the leaves or the brown stipules of the beech, which it has been suggested they do eat. In no single case did they eat other food in their first skin save and alone the one meal off their own egg-shell. It is a common thing for many larvæ to eat their own egg-shells, but so far as my experience goes, this is the only species that I have found for which one meal has proved to be all-sufficient for a seven-days' existence, or until the change of the first skin. I do not put this forward as anything new; still, perhaps the fact has not been quite so closely watched as I was enabled to do, and these details may prove of interest to some. Full details of its later changes of skin, and pupation of the larva of *S. fagi*, have been ably given in Buckler's 'Larvæ,' &c.—W. H. TUGWELL.

NOTES ON BOMBYX TRIFOLII.—During a stay at Salcombe, South Devon, this spring, I again had opportunities of observing the habits of the larvæ of *Bombyx trifolii*, but owing to the severity of the winter they were later than last year in appearing after hybernation; this year none appeared till April 26th, as against April 14th in 1894, and the two specimens secured on that day were very small indeed. These and several others found in April were at rest on dead bracken or bare stumps of blackthorn, and it was not until May 1st that I saw one actually feeding; my approach disturbed it, and it began wandering about; during the course of its wanderings it was attacked by an ant, from which it escaped by energetic writhing. At the end of a twenty-minutes' journey it got into a region of dead gorse, so I removed it to a place where there was some vegetation; it took two minutes to recover from the shock and then began cautiously to move; at last it fell-to on a blade of a short slender grass which grows among the heather—unfortunately I do not know its name; it devoured two blades of this, and then resumed its wanderings and was boxed. After this I had no further opportunities of observing these larvæ in their natural state; but this observation, as well as those recorded last year (Entom. xxvii. p. 198), seems to show that, at any rate in Devonshire, the larva of *B. trifolii* is a more general feeder than Mr. Bickerton Jones's note (*ante*, p. 56) would seem to imply. It may be worth mentioning that this year I found one larva on the east side of the harbour.—D. P. TURNER; Tonbridge, Sept. 13th, 1895.

CŒNONYMPHA TYPHON IN THE WEST OF SCOTLAND.—With reference to Mr. Arkle's note (*ante*, p. 257) regarding *Cœnonympha typhon*, in this district it is an exceedingly variable butterfly, even in any single locality where it may be taken. I have not a long series, but perhaps my best specimens were taken in North Knapdale, Argyleshire. The majority are of a dark tawny colour, though some are warmer in tone than others. I have one large pale-ochreous specimen which, though having the rudimentary eye-spot on the upper wing, has another, equally large and almost as distinctly marked, just below the median nervure, and ocellated on the under side; there are on the under side of lower wing seven distinct eye-spots, three being ocellated; the bar on this specimen is uninterrupted. Another very dark specimen, perhaps owing to its being smaller than usual, the under side of which, instead of being dusted with silvery grey, is of a rich brown dusted with green, though grey at the base; this specimen has six very large and prominent eye-spots on the under side of lower wing, all of which are ocellated, and another black spot joined to the spot at the inner margin; there are also two light markings on the under side of upper wing below the median nervure; the bar on this insect is decidedly broken. Another intermediate form has the rudimentary eye-spots entirely obliterated on the upper side of all the wings, and but the slightest indication of a spot on the under side of each; the bar is slightly broken. It would, however, take too much space to describe many specimens; they vary in colour, number of spots, and the bar on under wing is sometimes uninterrupted, though oftenest broken.—A. Adie Dalglish.

The Senses of Insects.—From practical observation I have certainly been under the impression that *some* Lepidoptera do possess the power of hearing independent of the sense of touch, serving them as a warning and protection. As instances I will cite firstly, *Boarmia repandata*. Frequently, when walking in woods searching for Lepidoptera at rest on the trunks of trees, this insect has started off some distance away, long before it was visible at rest; and I have known it, after re-settling, it may be, on the reverse side of a tree out of sight, start off before I could reach it. *Hypsipetes elutata* (*sordidata*) has frequently appeared to me to do the same; and in the case of *Cidaria truncata* I have frequently exclaimed, "That insect must have heard me." It is well known how much more acute the powers of vision are in some Lepidoptera, apparently, than others. *Tephrosia crepuscularia* is easily boxed at rest; *T. punctularia* I have not found so at all times. Some of the *Eupithecia* start off before you can touch them, or whatever they may be resting on; and other instances could be named showing that they, if at rest, have one eye open. Why then may not some have auditory powers more acute or sensitive than others? In the case of striking the trunks of trees the concussion or vibration would doubtless be the cause of disturbing the insects referred to; but their frequently taking flight when apparently no disturbing sound has been made by concussion appears to show the possession of another sense. It is well known how different species of Lepidoptera differ in their habits adopted for protection, some relying on very acute vision, others on their resemblance to their surroundings. May not some species, then, be able to detect sound apart from sensitiveness to concussion or vibration?—T. B. Jefferys; Bath, Sept. 19th, 1895.

Unusual Pairing of Dragonflies.—I think I ought to record the fact that on Aug. 15th last, in Talbot Woods, near Bournemouth, I took a male *Æschna cyanea* paired with a female *Æ. juncea*.—W. J. Lucas; St. Mary's, Knight's Park, Kingston-on-Thames.

South London Entomological and Natural History Society.—This Society announces an exhibition to be held at St. Martin's Town Hall, near Trafalgar Square, on October 17th next. We congratulate the committee of management upon having secured such a very conveniently situated building for the purpose, and we hope that all who are interested in natural history will give the enterprise their hearty support. Particulars may be obtained from the Hon. Sec., Mr. Stanley Edwards, Kidbrook Lodge, Blackheath, S.E.

CAPTURES AND FIELD REPORTS.

Mallota eristaloides.—I was glad to note in your last number that Mr. Dale reports having taken this insect (wrongly printed "*cristaloides*") as far back as 1880. The fact of this specimen being taken on the 18th, and mine fourteen years later, on July 20th, seems to mark the month when it should be sought for; and partly with this object in view I started for the New Forest on July 15th. Owing to the very hot weather during May and June, the season proved unusually early, and on my arrival I found nearly all the other Diptera I expected to collect were already over, although in 1894 they were only just coming out, and this may have been the case with *Mallota*, supposing it put in an appearance at all. My efforts, therefore, as regards this species were fruitless, or rather insectless; but I still hope we may have a *Mallota* year, as we have had those of *Callicera*, *Spilomyia*, &c.—F. C. Adams; 68, St. Ermin's Mansions, Westminster; and Fern Cottage, Lyndhurst.

Melanostoma hyalinatum and Callicera ænea.—The former insect has turned up in some numbers this year in the New Forest, and during the first fortnight of August I took nine males and nine females. It was still out when I left, and Mr. Venall informs me he has not seen it for twenty-five years. I also saw a fine specimen of *C. ænea* taken by a lady last June in a garden at Lyndhurst.—F. C. Adams; Sept. 12th, 1895.

Callicera ænea in Hampshire.—On May 22nd last I had the good fortune to capture a very perfect specimen of *Callicera ænea*, which settled on a rose in our garden. I believe I am right in saying that this fly has not been taken since 1888, when three specimens were recorded from different localities.—Laurence C. Chawner; Lyndhurst, Hants.

Deiopeia pulchella in Sussex.—When staying at Bexhill, this time last year, I succeeded in capturing a very fine specimen of *Deiopea pulchella*. —Alistoir R. Potter; Hazeldene, Bexley, Kent, Aug. 30th, 1895.

Stilbia anomala in Nottinghamshire.—I have the pleasure to record a fine specimen of *Stilbia anomala* taken here by my sister on Aug. 23rd. Newman says, "It would seem that no entomologist has observed it in the Midland Counties of England." I find an old note of its capture by the late J. Trueman, of Edwinstowe. But this is a solitary record, and moreover very old. Can any reader of the 'Entomologist' give me a more modern instance?—(Rev.) E. ALDERSON; Worksop, Notts.

ACHERONTIA ATROPOS IN CO. WATERFORD, IRELAND.—I copy the following extract from a local newspaper, the 'Waterford Standard,' dated Sept. 14th, 1895:—"Death's Head Hawk Moth.—A fine specimen of the Sphinx *Acherontia atropos* was captured at Tramore on the 2nd inst. by Mr. Thomas Power, who presented it to Dr. Norris Cane, of Mullinavatt. It is now four years since another specimen of this moth was caught in Waterford, and also presented to Dr. Cane by Dr. Geo. J. Mackesy."—L. H. BONAPARTE-WYSE; Manor of St. John's.

ACHERONTIA ATROPOS IN GLAMORGANSHIRE.—I have recently received a perfect male specimen of *A. atropos*, which was found being washed ashore in a breaker at Porthcawl by Mr. R. H. Tiddeman, who sent it through the post loosely laid in a tin box; notwithstanding this treatment, and a sea bath, it reached me uninjured, which is rather extraordinary.—F. W. FROHAWK.

ACHERONTIA ATROPOS IN SHROPSHIRE.—I have had eight larvæ of *A. atropos* brought to me; all were taken in small patches of potatoes in gardens in the town, and I hear of children playing with and destroying others. So far as I can ascertain there are few previous records of the occurrence of this species here. All the people who brought larvæ were astonished at them, and said that they had never seen such things before.—F. C. WOODFORDE; Market Drayton, Salop, Sept. 2nd, 1895.

VANESSA C-ALBUM IN SHROPSHIRE.—On Aug. 29th I saw a specimen of *V. c-album* on the outskirts of the town. It settled on a wall in the sun and spread its wings, but as I had no net with me I could not catch it.—F. C. WOODFORDE.

SPHINX CONVOLVULI IN 1895.—The 'Field' announces the following captures of *Sphinx convolvuli*:—One specimen, sent for identification, caught at rest by a workman while sorting bamboos, Alnwick, Northumberland. "J. F. G.," Benacre Hall, Wrentham, reports the capture of seven specimens during the first week of this month, the largest measuring 5 in. in expanse. "They haunt the tobacco plants at twilight, and dash around as with a purring sound, varied by a hawk-like hover over the fully-opened blooms." Mr. R. L. Bridger, Mitford-on-Sea, Hants, records the capture of eight specimens during the early part of the month, six of them taken on consecutive nights in a small greenhouse.—F. W. FROHAWK.

SPHINX CONVOLVULI IN HAMPSHIRE.—It may be of interest to note that twenty-three specimens of *S. convolvuli* have been taken here this season.—W. G. HOOKER; Sunny Side, Winton, Bournemouth, Sept. 10th.

SPHINX CONVOLVULI IN DEVON.—My brother and I have been staying for the last fortnight near Sidmouth, Devon. On Sept. 5th, a fine clear evening, with a very heavy dew, we had the fortune to find, hovering over a large bed of *Nicotiana affinis*, a large though rather rubbed female specimen of *S. convolvuli*. Again on the 7th, hovering over the same flower, we found a fine male example, quite undamaged. We have since heard of a lady in the neighbourhood who captured nine of the same species over the *Nicotiana* this season. We have also seen several specimens of *Vanessa cardui*.—G. H. NEEL; 17, Ladbroke Square, Notting Hill, W.

Sphinx convolvuli at Tunbridge Wells. — Mr. Chatfield, of this town, brought me a very fine specimen of *S. convolvuli*, which he took at rest near the Toad Rock on Rusthall Common on Aug. 27th. As far as I know, it has never been taken here before.—R. A. Dallas Beeching; Tunbridge Wells.

Sphinx convolvuli in Aberdeenshire.—A specimen of *S. convolvuli* was caught here on Aug. 31st; it was very much worn. A second was caught on Sept. 9th, in fine condition, the tips of the wings a little touched in capturing.—J. Salter; Strichen, Aberdeenshire.

Sphinx convolvuli in Surrey.—I have much pleasure in recording the capture of *Sphinx convolvuli*, male, in our own garden on the 12th inst. It was apparently attracted by the tobacco plant. I also had a female brought me which has deposited a number of eggs. — Geo. Stanley Morley; Oakdene, Epsom, Sept. 19th, 1895.

Leucania albipuncta near Ashford. — I captured a specimen of *L. albipuncta*, at sugar, near here on August 24th. — D. Chittenden; Willesborough, Lees, Ashford, Kent.

Xanthia gilvago in North Shropshire. — From a large number of larvæ, beaten on June 1st from the seed-vessels of the wych-elm, I have just bred two specimens of this local species; the remainder (about 100 in number) turning out *X. ferruginea* (*circellaris*). I believe this is a new locality for the insect. — (Rev.) Chas. F. Thornewill; Calverhall Vicarage, Whitchurch, Salop, Sept. 7th, 1895.

Catocala nupta attracted by Cossus. — On Sept. 14th, about 11 p.m., when passing through Barnes, my attention was drawn to some moths flying round the trunk of a large poplar tree, which on examination proved to be inhabited by *Cossus* larvæ. These moths turned out to be *Catocala nupta*, evidently attracted by the effluvia of these larvæ. I found altogether nine females and one male, six of the former taken at rest; these allowed me to approach and bottle them without trouble. I saw many others, but failed to capture them.—H. W. Bell-Marley; Ravenscourt Park.

Polia flavicincta in Yorkshire.— On Sept. 12th I found a fine specimen of *Polia flavicincta* at rest on a wall in the town at Scarborough, and on the 16th I found another specimen. I thought this worth recording because I believe this species is not often met with so far north.—H. W. Shepheard-Walwyn; Bidborough, near Tunbridge Wells.

Broscus cephalotes at Retford. — In my first year's collecting Coleoptera I have made one "find" that may be worth reporting. I took a dozen specimens of *Broscus cephalotes* at Retford. It is described in the books as purely a coast insect.—Stephen Pegler; Retford, Sept. 16th.

Colias edusa in Britain in 1895.—

Berkshire.—On Aug. 18th I saw two male *C. edusa*, and captured one, in fine condition; and on Aug. 25th I captured one male very much worn.—W. E. Butler; Hayling House, Reading.

Cornwall.—During a ten-days' visit to the far south and west of Cornwall I noticed six specimens of *C. edusa*, all on the cliffs or on the sandhills ("towans" as we call them in Cornwall) of the sea-coast. Two of the specimens were seen at Lelant on Aug. 27th, three at the Lizard on the

28th, and one at Hayle on Sept. 1st. Butterflies in general were numerous, the only conspicuous exception being *Pyrameis cardui*, of which I did not see a single example, common Cornish species as it is *Satyrus semele* abounded on the farthest steeps of the Land's End, while *Vanessa urticæ* swarmed everywhere. The beautiful sea-holly, which grows commonly on that coast, seemed to have stronger attractions to butterflies than any other flower then in blossom.—Harold Hodge; 2, Essex Court, Temple.

Devonshire.—Several specimens of *C. edusa* seen during the last week in August at Barnstaple, Devon.—'*Field.*' Whilst staying at Sidmouth for the last fortnight, my brother and I saw several specimens of *C. edusa* about the cliffs.—G. H. Neel; 17, Ladbroke Square, Notting Hill, W.

Kent.—On Aug. 22nd I saw a specimen of *C. edusa* near here, two others also being seen, and on Aug. 28th I took one specimen.—D. Chittenden; Willesborough, Lees, Ashford, Kent. On Aug. 1st I witnessed the capture of a male *C. edusa* near here by a friend.—D. P. Turner; 14, Havelock Road, Tonbridge.

Suffolk.—At Clare this summer I took three specimens of *C. edusa*, a female on Aug 15th and males on the 20th and 21st. Afterwards, at Brightwell, near Woodbridge, I saw a *Colias*, presumably *edusa*, on the heath; this was on Sept. 3rd. On the following day I caught a male *edusa* not far from the same spot.—D. P. Turner.

Sussex.—Hearing that a few specimens had been seen about the end of May last, and knowing they meant that an "*edusa* year" would follow to some extent, I journeyed to Littlehampton on Aug. 25th, accompanied by Mr. J. H. Carpenter, for the express purpose of meeting with this interesting species. We had not long arrived before a worn male was captured, and later on we captured a few more, including a worn *helice;* about a dozen specimens were taken, mostly males, all of which were set at liberty, being more or less worn. The females only were kept for ova.—F. W. Frohawk; Sept. 14, 1895. During a week's stay near Brighton about the middle of August, I noticed that *C. edusa* was fairly plentiful and usually in good condition, in the clover and lucerne fields on the coast between Brighton and Newhaven.—H. W. Andrews; Victoria Road, Eltham. Whilst staying at Brighton for a fortnight, from Aug. 10th to 24th, my brothers and I took *C. edusa* commonly. Among the specimens captured were three examples of the var. *helice* and a male with the black spot in the centre of each fore wing replaced by a red one. Is this of common occurrence?—C. E. Bedford; Murivance, Acton, W.

Wiltshire.—Twenty specimens of *C. edusa* seen Aug. 17th at Salisbury. '*Field.*' During August and September *C. edusa* has been very abundant. My sister took a sulphur-coloured variety in the early part of August.—C. W. Gummer; 2, Swayne's Close, Salisbury.

SOCIETIES.

South London Entomological and Natural History Society.—*August 22nd*, 1895.—Mr. T. W. Hall, F.E.S., President, in the chair. Owing to the holidays and the storm the meeting was unusually small. Mr. South exhibited smoky varieties of *Rumia luteolata*, L., taken this year near Macclesfield; also specimens of *Hypermecia cruciana*, L., *Tortrix cinnamoneana*, Tr., *Eupithecia venosata*, Fb., and *E. pulchellata*, St., from the same locality. Mr. Hall stated that he possessed similar varieties of *R. luteolata* from Scotland. Mr. Moore, series of the following Arachnidæ from St. Augustine's, Florida, viz.:—*Nephila clavipes*, *Atreus americanus*, and *Gasteracantha cancriformis*. Mr. West, of Greenwich, specimens of *Chrysomela gœttingensis*, L., taken this year at Bookham and Box Hill, and remarked that he had never taken the species before. Mr. Turner, specimens of *Scodiona belgiaria*, Hb., from Oxshot and Shirley, and a series of *Hadena pisi*, L., bred from larvæ obtained at Barnes, and showing considerable variation, from almost uniform reddish brown to forms having a deal of greyish white marking. Several members reported having seen or captured *Colias edusa*, Fb., and one var. *helice* had been taken in the Isle of Wight. Mr. Barrett stated that Noctuæ were very abundant in the North of England, especially *Orthosia suspecta*, Hb., which simply swarmed. *Noctua depuncta*, L., was also reported in some number.

Sept. 12*th*.—The President in the chair. Mr. Jäger exhibited a melanic specimen of *Agrotis vestigialis*, Hufn., from North Wales, both upper and lower wings being black. Mr. Winkley, a species of *Dermestes* from Japan. Mr. Fremlin, a fine series of *Polia chi*, L., var. *olivacea*, St., from Cheshire; a bred series of *Phorodesma smaragdaria*, Fb., from Essex; and a bred specimen of *Prionus coriarius*, L., from Surrey. Mr. Tutt, a number of cases of a large species of *Psyche* from the Argentine Republic. They were mostly cocoons of the vermicular female, and contained either young larvæ or ova. He stated that a similar species had recently been described in America as causing much damage. Mr. Adkin, series of *Dianthœcia nana*, Rott., and *D. capsincola*, Hb., bred from N. Devon larvæ, one of the former being of a rosy tinge; also a curious bred specimen of *Bombyx quercus*, L., var. *callunæ*, Palm, with the outer half of each wing devoid of scales, while the fringes were perfectly developed. Mr. Hall, a male specimen of *Lycæna bellargus*, Rott., from Folkestone, having the under side of the left secondary destitute of spots, the other wings being normal. Mr. Tutt, a large number of species of *Erebia* and allied genera from the Alps, and read a most interesting paper on their affinities, habits, and localities, making especial reference to the presence, absence, and development of the eye-like markings; he also said that he had taken a large number of *Zygæna exulans*, Hüb., some being of the semi-diaphanous Scotch form. Mr. Enock exhibited and described at some length the egg-parasite *Trichogramma evanescens*, which was only ½ mm. in length. He stated that he had made some 180 drawings of the various details of its history and structure, and called attention to the economic benefit of his observations if the farming of these minute creatures was carried out on a large scale.—Hy. J. Turner, *Hon. Report Sec.*

Birmingham Entomological Society. — *August* 19*th*, 1895.—Mr. G. T. Bethune-Baker, President, in the chair. The Secretary called attention to the fact that this was the 100th meeting of the Society. Exhibits:—By Mr. R. C. Bradley, a number of insects taken on Cannock Chase, at Whitsuntide, including *Leucorrhinia dubia* and other dragonflies; *Nomada ochrostoma*, *ruficornis*, *flavoguttata*, and other Aculeates, and some Lepidoptera. He also showed the specimens of a

Solenobia which he had taken this year with Mr. A. H. Martineau, and which Mr. Barrett had identified as *wockii*. By Mr. A. H. Martineau, *Myrmosa melanocephala*, one, from Sutton; *Anthidium manicatum*, one, from Bridgnorth; also a series of *Crabro dimidiatus*, which he had taken at Sutton, together with the insects they had captured, which consisted of four specimens of a *Dolichopus*, one *Scatophaga*, and two different Anthomizias. By Mr. P. W. Abbott, *Lithosia muscerda*, and *Nonagria brevilinea*, with its var. *alinea*, from Norfolk. By Mr. G. W. Wynn, a number of insects from Wyre Forest this year, including *Boarmia roboraria*, *Dipterygia scabriuscula*, and *Xylophasia monoglypha*, one quite black, one dark with a pale triangular patch on the inner margin of the fore wings. By Mr. Wainwright, for Mr. C. A. E. Rodgers, one *Aplecta occulta*, taken several years ago in Bagots Park, Staffs., on sugar; one *Heliothis* (*Chariclea*) *marginata* (*umbra*), from Malvern; and one *Zeuzera æsculi*, from Handsworth; also *Syrphus annulipes*, from a third locality, Lynton, in North Devon; this species, which he found for the first time last year near Stroud, has thus been now taken in three widely separated localities, and this makes the fifth specimen.—Colbran J. Wainwright, *Hon. Sec.*

Nonpareil Entomological Society.—*Sept. 6th*, 1895.—Mr. T. W. Jackson in the chair. The exhibits were as follows:—By Mr. Sampson, specimens of *Halia wavaria* which were bred in his garden at Dalston; black-and-white forms of *Abraxas grossulariata*, the yellow being entirely absent; pupæ (living) of *Chærocampa elpenor*, the larvæ of which he found at Maldon, Essex, in August this year. By Mr. Norman, continental specimens of *Papilio podalirius* which he bred, some of them vividly marked (he mentioned that he had bred a great many specimens, and had failed to get any very marked variations); specimens of *Cynthia pernyi* and *cecropia* which were bred by himself; also some very interesting Coleoptera, amongst which were *Dytiscus marginalis*, *Hydrophilus piceus*, *H. colymbetes*, and *H. acilius*, taken by himself at Enfield, and which he said were very plentiful in that neighbourhood. By Mr. Gurney, specimens of *Ocneria dispar*, the males of which varied considerably in depth of colour. By Mr. Jackson, a magnificent variety of *Arctia caia*, which was of a cream colour with just a dark patch here and there on the upper wings; it was compared with Mosley's varieties, and is totally different from anything figured there. By Mr. Raine, a preserved larva of *Pyrella* which he found feeding on Dr. Allinson's food; it was webbed all round with the food. By the Secretary, some specimens of *Cataclysta limnalis*, *Hydrocampa stagnalis*, and *H. nymphealis*, which were captured round a pond at Woodford; he found that they were very plentiful, but rather difficult to get at, as they flew on the rushes just out of reach, and when they settled they would get as near the bottom of the plants as possible, and were difficult to dislodge. By Mr. Lurby, two specimens of *Catocala nupta*, which seems to be rather scarcer this season.—J. G. Craft, *Sec.*

Obituary.—We learn with great regret that Mr. W. H. Tugwell, of Greenwich, died on September 20th.

THE ENTOMOLOGIST

Vol. XXVIII.] NOVEMBER, 1895. [No. 390.

MR. W. H. TUGWELL ON *ZYGÆNA EXULANS.*

By T. A. Chapman, M.D., F.E.S.

I send you an extract from a letter from my friend the late Mr. W. H. Tugwell, dated Sept. 10th, 1895, which has a melancholy interest as being perhaps the last entomological work he did. I ought to say that the letter was not, of course, intended for publication, and I have no right, perhaps, strictly speaking, to publish it; but I am sure Mr. Tugwell would not have objected, and no one will, I think, quarrel with me for doing so. Mr. Tugwell had always taken much interest in *Zygæna*, and especially in *Z. exulans*, and last year he asked me to get him some continental specimens, should I meet with it this year. I was fortunately able to do so, and had the pleasure of giving him a few specimens, and of seeing a long series of Braemar specimens in his drawers. My own impression was that the very finest Braemar specimens had a *Psyche*-like flimsiness that I have never seen in any continental specimens I have captured. A few specimens taken in the Tyro lwere perhaps as free from yellow or pale colouring as the Braemar forms, but they were denser and darker than the Scotch examples. Mr. Tugwell had not seen these at the date of his letter, and I am not aware that he has left any record of his opinion about them. Mr. Tugwell wrote:—

"I have carefully gone through the *Zygæna exulans* you so kindly brought me from Oberalp, and by daylight, and being set, they now show their characters well, and some of them, the females, are strikingly beautiful; I have never seen anything at all like them amongst the Braemar examples. All your specimens, when perfect, are very much more dense in the scaling, and, too, always much brighter in coloration, *i. e.*, the red is generally of a totally different tone, a tendency to show of a deep rose-colour instead of carmine; the colour of the Oberalp specimens in the spots of superior wings is uniform over the whole area of spots, whilst in the Braemar specimens these spots are never uniform in colour, but have a deeper centre spot surrounded by an ochreous tone on the outside of all the spots. But the most striking feature is that the males in the Oberalp specimens always show the pale collar, not so strongly as the females, but it always does show as a spot on each shoulder, at times only faintly, but still apparent; and the legs, too, in the males are whitish or yellowish, less so than in the females, but still pale, whilst in the Braemar specimens the legs are always black or nearly so on the top, paler beneath. I have never seen the slightest sign of a white or pale spot on the shoulder of a Braemar male, whilst the Oberalp specimens always show some white or yellow, so that in the most worn specimens you pick them out from Scotch by the Oberalp males having pale spots on the collar and legs paler than the Scotch males.

"I am certain that there is a great difference, readily recognisable by any one not prejudiced. *Not one* of the 120 odd specimens you kindly brought me would mislead me; not one could I pass as Scotch, unless so denuded of scales as not to be recognisable at all."

T. A. Chapman, Firbank, Hereford.

ON THE PROFUSION OF RHOPALOCERA IN THE ALPS AND THE RELATIVE PROPORTIONS OF SPECIMENS TO SPECIES.

By W. Harcourt-Bath.

In a former paper (*ante*, 247) I referred to the abundance of species of Rhopalocera which occurred in the Alps, in comparison with the number existing in most of the other portions of the Palæarctic area, even situated considerably further to the south. This has been brought about by reason of the central geographical position occupied by the region in question, combined with the considerable extent of surfaces existing at successive elevations above the sea level, which furnish a series of climatal conditions favourable to the growth of a great variety of vegetation suited to the different vertical or ascending zones. In sheltered valleys on the southern slopes of the Pennine and Lepontine chains we perceive the vegetation of Piedmont and Lombardy sufficiently austral in its general aspect, with its attendant olives, oranges, and evergreen shrubs, truly typical of the warm temperate region. At the northern base of the Alpine range, commencing also in equivalent zones upon the southern side, we pass successively in ascending climatal belts wherein flourish vines, maize, and tobacco; then walnuts and sweet chestnuts, beeches, oaks, and wheat; above them, forming a very broad belt, the great tract of conifers; then brilliant-coloured alpine flowers and lichens, until we arrive at the perennial snows of the higher mountain peaks. These represent isothermal differences as great as exist between Italy in the one direction and the polar regions in the other.

To the entomologist who has only been accustomed to collecting on this side of the English Channel, whose experience has been confined to no better fare than what the New Forest can afford, the Alps constitute a perfect El Dorado of butterfly abundance and beauty. It is true that the general facies of the rhopalocerous fauna does not differ so much from that existing in these humid isles, but the great interest accrues in the number of closely allied forms occurring there, side by side with the more familiar ones of our own woods, fields, and commons, thereby affording abundant material for the student of evolution and morphology, as well as a more extensive series of species for the collection. What does the British entomologist know, for instance, of such typical genera as *Erebia*, *Syrichthus*, *Satyrus*, *Melitæa*, *Chrysophanus*, with their miserable quota of 2, 1, 1, 3, and 1 species respectively, compared with their corresponding numbers in the Alps, namely 25, 7, 8, 11, and 10, in addition to as many more local races and well-marked permanent geographical varieties?

Compared with many parts of the tropics, however, the Alps of course constitute a poor collecting-ground as regards the number of species occurring upon them. But like most other portions of the Palæarctic area, what they lack in variety of forms and specialisation is fully made up in the great quantity of individuals of many species which exist upon their slopes.

It will be found a general rule, that the further we recede from the tropics the less number of species we are able to meet with; on the other hand the number of individuals increases, the differences reaching their extremes at the equator in the one direction and in arctic regions in the opposite. The Alps constitute no exception to this law, in fact they furnish a very good illustration of the subject under consideration. In the lower valleys which constitute the equivalent of the temperate zones by far the most species are to be found, but it is at the alpine elevations which represent the arctic regions of the horizontal isotherms where individuals generally abound to the greatest degree. It is perfectly astonishing with what profusion some species are to be met with in good localities upon the mountains, such, for instance, as *Pieris callidice*, *Colias phicomone*, *Chrysophanus virgaureæ*, *Melitæa didyma*, *M. dictynna*, *M. parthenia*, *Argynnis pales*, *A. niobe*, *A. amathusia*, *Cœnonympha satyrion*, *Satyrus cordula*, in addition to a great many species of *Erebia* and *Lycæna*. The conspicuous handsome crimson-ringed Apollo (*Parnassius apollo*), which is perhaps the most typical butterfly of the Alps, also abounds in many situations. A precisely parallel case is presented in the great elevated pseudo-arctic plateau in Scandinavia known as the Dovrefjeld.

We will now consider some statistics in support of the foregoing contention. The late Mr. H. W. Bates, who spent eleven years of his lifetime in the immense tropical forests of the Amazons, informs us that the number of species of Rhopalocera which he procured in the neighbourhood of Para was 700, their corresponding total in the Alps amounting to about 200. The number which constituted his daily "haul" fluctuated between 40 and 70, though upon several occasions it rose as high as 100. But the number of specimens he took of each species was exceedingly small, only averaging one or two apiece, with few exceptions. He in fact experienced extreme difficulties in securing a series of a great many species, to obtain which a good deal of patience and perseverance was required, even with those of average plentifulness. Almost every day new kinds would crop up, and often but a comparatively small proportion of those he captured the previous day would show themselves on the succeeding one, as the following extract from his diary will exhibit:—"On Tuesday, collected 46 specimens of 39 species. On Wednesday, 37 specimens of 33 species, 27 of which are different from those taken on the preceding day." He adds, however, that the number of specimens would be increased if he had reckoned all the commonest species seen. These data may be taken as fairly typical.

At Ega Mr. Bates obtained 550 species in the course of four years. In the Malay Archipelago Dr. A. R. Wallace says that any of the islands will produce from 150 to 250 species after a few months' assiduous collecting, and that 30 or 40 may be procured any fine day in good localities. The eastern equatorial regions, therefore, fall far short for richness when compared with their equivalents in the western hemisphere, where twice the number of species per day constituted the average capture of Mr. Bates; but it is probably the case that the proportion of specimens to species in the two regions is not the same, a greater percentage of the former possibly occurring in the Malay Islands than in the neotropical forests; but unfortunately Dr. Wallace has omitted to say anything on this score in his interesting work on the great 'Oriental Archipelago,' from which I have abstracted the preceding information.

Now in the Alps, as I have already remarked, a great many individuals *per capita*, on the average, seems to be the prevailing rule. In support of this I will furnish a few figures from my own personal observations. On the Riffel Alps above Zermatt I captured in the course of six hours 250 fine specimens representing about 20 different species, which gives an average of 12·50 apiece. This occurred at an elevation of some 8000 feet above sea-level, in the upper alpine zone above the belt of pine trees. At Randersteg, some 4000 feet lower, among the conifers, I netted 200 specimens one morning, representing about 35 species, which gives an average of about 6 apiece. Both events happened in the month of July, and may be taken as fairly typical of the relative proportions of specimens to species which can be obtained in the regions in question in comparison with their corresponding numbers in the tropical zones. The largest number of species which I have met with in a single day in the Alps is about 40 in the month of July, but the average appears to be considerably less, being somewhere about 30 for the lower and between 10 and 20 for the upper alpine region. In the South of England the three largest hauls which I have ever made occurred in the months of August, May, and July, upon which occasions I captured 21, 20, and 18 different species respectively; but the average generally falls far below these figures, even in the best localities. The percentage of specimens to species appears to approximate very closely to that occurring in the Alps in equivalent climatal zones.

I will now consider the causes which have produced the foregoing phenomena. In conformity with the theory of evolution by means of natural selection, it may be taken for granted that whenever a species is scarce its struggle for existence is very great; on the other hand, when it is plentiful it has not many enemies to contend with. In the tropics butterflies have many enemies to contend with in the shape of insectivorous birds, reptiles, batrachians, bats, dragonflies, spiders, besides a host of other parasites. Competition between closely-allied species must also be exceedingly great. These must all be providing plenty of scope for the play of natural selection, and thus new species will constantly be given ample opportunity of coming into existence. On the other hand, adverse climatal influences will have little effect in curtailing their numbers. Unlike the temperate regions of the earth, the tropics have, so far as we know, never experienced the ill effects of a glacial period, which has proved such a powerful agent in reducing the number of species which have from time to time established themselves within the sphere of its periodic influence. Species in the tropics have therefore been permitted to accumulate without any restraint of this nature for many thousands of years.

In the Alps, on the contrary, the number of enemies which prey upon butterflies is comparatively insignificant. In the surrounding plains reptiles, batrachians, and birds are pretty plentiful; but it is precisely here where the greatest number of species of Rhopalocera occur, which is in direct confirmation of my theory; while among the mountains, above a certain elevation, they are exceedingly scarce, Arachnida—which, by the bye, are eminently characteristic and abundant in the Alps—being the only enemies of any consequence. The same thing also exists in boreal regions. This, then, accounts for the superabundance of certain species, which are permitted to multiply without any check except what they receive from adverse climatal influences. At the same time this immunity from attack does not favour the rapid evolution of new forms. Climate is probably the most important factor in the production of new species in the Alps and in other portions of the Palæarctic area. To put the matter in a nutshell, great competition favours the evolution of species, while little competition produces individuals.

It may probably be admitted that nature always permits the production of the greatest number of individuals in a given area which are capable of existing in it, so that, all other things being equal, a new species can only come into existence by wholly or partially crushing out one or more other species. Competition generally being the greatest between closely-allied forms, those which are the most nearly related to it are in consequence principally affected by any change in the equilibrium. Supposing ten different species to exist in a certain district possessing an average of 1000 specimens apiece, which means that the locality is capable of supporting 10,000 individuals, the evolution or immigration of one new species would upset the former balance entirely, for then there would be eleven species, with a reduced average of about 909 individuals *per capita*, the total number, as I have remarked above, remaining the same. The addition of ten new species would give an average of only 500 to each, and so forth.

These, then, are the principal answers which, in my humble opinion, can be supplied in elucidation of the problems connected with the relative large percentage of specimens to species of Rhopalocera in the Alps in comparison with their proportions in the tropical regions of the earth.

Birmingham, October 18th, 1895.

CALLIMORPHA HERA IN SOUTH DEVON.

By W. Hewett.

Whatever doubts may have existed with regard to the genuineness of *C. hera* as a British species, there need be none as to its occurrence in South Devon at the present time. I have reliable evidence of more than one hundred specimens having been taken there this season, of forty-eight of which I have become the proud possessor. Twenty-five of these were taken by myself and two by my wife whilst in the district last August; the remaining twenty-one were all brought to me alive, mostly in a more or less bruised condition, and minus much of the "down" from their wings. Although in the district from the 8th to the 19th, I only devoted seven days to the species, spending the rest of the time in trips to Torquay, Babbacombe Bay, Dartmouth, Exmouth, Dawlish, Teignmouth, Powderham Castle and Park, not forgetting to mention a most delightful trip down the English Rhine, the Dart, from Totnes to Dartmouth.

C. hera was discovered in its present haunts by my friend Mr. William Brooks, of Grange Hall, Rotherham, who took the first specimen in August, 1882 (see 'Entomologist,' vol. xvii. page 233). It was he who first informed Mr. Jäger of its occurrence there, which will doubtless explain that gentleman's partiality for South Devon as a collecting-ground ever since.

Mr. Brooks very kindly supplied me with full details of how, when, and where to get *hera*, so that on my arrival no time was lost in "beating about the bush" for the locality. The late Major Still, of Seaton, Devon, had at first intended joining, but was unfortunately unable to do so.

I suppose it is hardly necessary for me to mention that the insect is to be obtained during the day-time by beating them out of the hawthorn-hedges, especially where there is an abundance of holly and ivy, as they show a decided preference for these evergreens. The next thing, after getting *hera* to take to flight, is to capture it, and this, in spite of all reports to the contrary, I did not find a feat difficult of accomplishment. Indeed, without wishing to pose as a "dead shot" with the net, for me to see the moth was in most cases to take it. Of those I saw I only missed three specimens, and I never had a fair chance with one of these. It is generally imagined that fine sunny weather is the best in which to beat out *hera*, but here again I must admit that such was not my experience, as during the first four days, which were all dull and showery—very showery—I had much better luck than during the remaining three, which were unusually fine and sunny; besides, the heat was at times oppressive, making working for it by no means an easy pastime, and I could literally say I obtained my series "by the sweat of my brow."

The Rev. Dobrée Fox, of Castle Moreton, Tewkesbury, informed me that *C. hera* flies between 8 and 10 a.m.; this, I believe, is its habit on the Continent, but was not my experience with it at Starcross, as, although generally on the ground by 9 a.m., I did not notice any so flying, and only heard of one which was seen flying over a turnip-field about noon, I believe, by Messrs. Mitchell and Robson, of London. Mr. Brooks also says that he never saw any specimens on the wing other than those which he disturbed.

The moth is pretty quiet when netted, and is not difficult to box, or "noisy" when in the box. I kept mine alive in 2-oz. chip pill-boxes until I reached my lodgings, without apparent harm to the insects, when the males were killed, and the females kept for eggs, which they deposited freely on the bottom and sides of the boxes, somewhat after the manner of *A. caia.* The eggs when first laid are primrose-coloured, but just before hatching they turn to a beautiful purple colour.

My specimens were first stupefied with chloroform, and then killed with oxalic acid. This is a method I can strongly recommend to all entomologists as being most satisfactory, leaving the insects operated upon beautifully relaxed and ready for immediate setting. Of the forty-eight specimens which I obtained, not more than six were in first-rate condition, and, owing to my sacrificing all the females for eggs (some obstinately refused to lay), my specimens, to say the least of it, are not so fine as they would have been if I had killed them as soon as captured; still, as the seventeen females from which I obtained eggs laid some 2261 eggs, or an average of 133 each, I suppose there is no reason for complaint. Very few of the eggs laid were infertile; some, although they changed colour, did not seem to have sufficient strength to break the shell, and so died without emerging. The eggs hatched in from thirteen to eighteen days; fourteen batches averaged fifteen days' duration in the egg state.

The young larvæ at once commenced to demolish their egg-shells, on which they seem to live for the first two or three days. I gave mine a variety of food-plants, but the majority preferred raspberry, which I supplied them with until October 2nd. Some of them I then sleeved on 12-inch pots containing a strong growth of dandelion, ground-ivy, plantain, and dock, also on healthy plants of ground-ivy which I had potted some time previously, and the larvæ are at present quite at home and doing very well. I have placed the pots in a room having a south-west aspect, and shall examine them on an average once a week until spring arrives. There will be neither fire nor gas in the room, so that a fairly even temperature will be maintained. The two essentials seem to be to keep them dry and not overcrowded. If the least crowded, they have not the slightest objection to eating their brothers and sisters, especially those that have just moulted. A correspondent informs me that of forty-five newly-hatched larvæ, he could only find thirty a few days after, and was quite sure that none had died a "natural death." Mr. Porritt lost a number last year through this cause after they had safely passed the rigours of a very severe winter, he having occasionally to thaw the larvæ.

The Rev. C. Benthal informed me that he had once taken the chrysalis of *C. hera* amongst some dandelion in his garden, and that he had on more than one occasion discovered the larvæ feeding on dandelion.

The following is a list of the food-plants, on all of which larvæ of *C. hera* will feed. I am inclined to think, from the habit this species has of resting on and amongst ivy and holly, that the larvæ will eat these plants, but I have not, so far, put them to the test:—Raspberry (*Rubus idæus*), dog rose (*Rosa canina*), hawthorn (*Cratægus oxyacantha*), dog mercury (*Mercurialis perennis*), comfrey (*Symphytum officinale*), common red nettle (*Lamium purpureum*), coltsfoot (*Tussilago farfara*), celandine flowers (*Chelidonium majus*), groundsel (*Senecio vulgaris*), ground-ivy (*Glechoma hederacea*), white dead-nettle (*Lamium album*), greater plantain (*Plantago major*), knotgrass (*Polygonum aviculare*), dandelion (*Leontodon taraxacum*), forget-me-not (*Myosotis palustris*), borage (*Borago officinalis*), viper's bugloss (*Echium vulgare*), lettuce (*Lactuca*). Of these, according to all accounts and my own experience, I should give first place to raspberry and knotgrass before hybernation; whilst for hybernating them on, ground-ivy, dandelion, and garden strawberry are the best; after hybernation, white dead-nettle and dandelion. Mr. G. T. Porritt, of Huddersfield, hybernated his on dandelion and garden strawberry, whilst Mr. C. Fenn, of Lee, brought his through the winter on ground-ivy. Both these gentlemen, I may add, were very successful. The larvæ have at first a certain amount of resemblance to those of *C. dominula*, and like to rest on the dead and shrivelled leaves of the food-plant.

Mr. Benthal said that, according to his experience, sixty was the average number of eggs laid by *hera;* those I obtained averaged 133 each, but this increase in the number of eggs is easily accounted for when it is considered that most of my females were in good condition, whereas when they are worn there is a great chance of their having deposited a part or the whole of their eggs. Still there is this to be said, that when worn they are more likely to be fertile than freshly-emerged specimens. Mr. Benthal also said that the earliest record for *C. hera* that he knew was July 29th of the present year, and the latest he had known was September 15th, 1894; and that during the four years he had been in the district he had obtained about forty specimens, or a few more, counting very worn ones, which at first he used to set at liberty, but afterwards kept for eggs.

As the result of numerous tête-à-têtes with the villagers, especially those of the "sere and yellow leaf," I learned that *C. hera* was formerly much commoner than at present. Many used to be attracted by the light (not a very brilliant one either) in the cottagers' windows, as many as three or four coming in one night, whereas now they did not see that number in a season. Although I do not share in the opinion expressed by some, that *hera* will shortly become extinct on account of being overworked, still it must be admitted that it is getting scarcer at its headquarters; but it is satisfactory to know that it is gradually spreading its range, and now occurs over a wide tract of country from Exeter to Teignmouth and Torquay, and will, when looked for, and, what is more, worked for, doubtless turn up elsewhere in the district, probably throughout the whole of South Devon. Mr. Porritt, whilst in the district last year from Aug. 20th to 30th, took twenty specimens, but the weather for the most part was very bad (Entom. xxx. 223). Mr. A. Jones, of Shrublands, Eltham, Kent, whilst at Starcross on Monday, Aug. 19th, took three specimens, two males and one female, all of the yellow variety *lutescens*, the female laying only five eggs. Mr. Gervase F. Mathews, of Dovercourt, Essex, who was also at Starcross on the 19th, did not take one. Although Messrs. Mitchell and Robson, of London, whilst at Starcross worked "light" several times, they failed to attract *hera;* nor could I hear of more than three specimens being so obtained this season.

On the evening of Wednesday, August 14th, I took two fresh-looking females, which I had captured that day, in a gauze cage to the ground in the hope of attracting a few males; but although I waited patiently, none came. I afterwards found that these females had been impregnated, as they each laid a number of eggs a few days afterwards which proved fertile. From my experience of "assembling," I am inclined to think that three or four newly-emerged females would attract a number of males, and strongly recommend this means to any entomologist who may hereafter visit the grounds. On August 18th, Mr. Benthal had a newly-hatched female in a breeding-cage out of doors. This was visited between 6.30 and 7.30 p.m. by a male, seen on three different occasions, and presumably the same. It was captured about 8 p.m., and put along with the female.

The following particulars will show, under their respective headings, the number of eggs laid by the various forms, *viz.*, orange, red, and yellow, when laid, date hatched, duration in the egg state, also the average number of eggs laid by the different forms, together with the total average for the three forms:—

Orange.

(1) 49 eggs; laid Aug. 14 and 15; hatched Aug. 30 and 31; in egg state 16 days.

(2) 163 eggs; laid Aug. 17, 18, and 19; hatched Sept. 3, 4, and 5; in egg state 17 to 19 days.

(3) 142 eggs; laid Aug. 17, 18, and 19; hatched Sept. 1, 2, and 3; in egg state 15 days.

(4) 228 eggs; laid Aug. 13, 14, and 15; hatched about Sept. 26 and 27.

(5) 75 eggs; laid Aug. 13, 14, and 15; eggs lost in transit through the post.

(6) 125 eggs; laid Aug. 16, 17, and 18; hatched Aug. 30 and Sept. 1, 2, and 3; in egg state 14 days.

Total orange form, 782 eggs; average 130 eggs each.

Red.

(1) 97 eggs; laid Aug. 13, 14, and 15; hatched Aug. 26 and 27; in egg state 13 days.

(2) 126 eggs; laid Aug. 10, 11, and 12; hatched Aug. 23 and 24; in egg state 13 days.

(3) 74 eggs; laid Aug. 17, 18, and 19; hatched Aug. 31 and Sept. 1 and 2; in egg state 14 days.

(4) 197 eggs; laid Aug. 13, 14, and 15; hatched Aug. 31 and Sept. 1, 2, and 3; in egg state 18 days.

(5) 44 eggs; laid Aug. 30 and 31, and Sept. 1; hatched Sept. 12, 13, and 14; in egg state 13 days.

Total red form, 538 eggs; average 107 eggs each.

Yellow.

(1) 44 eggs; laid Aug. 17, 18, and 19; hatched Aug. 31 and Sept. 1; in egg state 14 days.

(2) 214 eggs; laid Aug. 12, 13, and 14; hatched Aug. 26 and 27; in egg state 14 days.

(3) 198 eggs; laid Aug. 12, 13, and 14; hatched about Aug. 26, 27, and 28.

(4) 155 eggs; laid Aug. 13, 14, and 15; hatched Aug. 28, 29, and 30; in egg state 15 days.

(5) 254 eggs; laid Aug. 14, 15, and 16; hatched Aug. 31 and Sept. 1 and 2; in egg state 17 days.

(6) 76 eggs; laid Aug. 19, 20, and 21; hatched Sept. 5, 6, and 7.

Total yellow form, 941 eggs; average 156 eggs each.

Thus seventeen females averaged 133 eggs each, and fourteen batches of eggs averaged 15 days' duration in egg state.

Of the forty-eight specimens (20 males, 28 females) of *C. hera*, obtained by me near Starcross in August last, seventeen (8 males, 9 females) were of the red form, eleven (4 males, 7 females) were of the orange form, and twenty (8 males, 12 females) were of the yellow form.

Mr. C. Fenn, in a letter dated Sept. 9th, says:—"As pupation approaches put them into some sort of cage that has plenty of earth (at least six inches in depth), with a lot of mixed rubbish, like rotten wood and moss, as they like to spin deep down among such stuff; some of mine went down eight inches below the surface. Keep them fairly moist, and they will emerge at the end of June."

This fine and handsome species, so far as I have been able to ascertain, is very constant in its markings; but in addition to the *orange*, *red*, and *yellow* forms, referred to above, I have pleasure in placing on record, for the first time, particulars of three varieties, all of which occurred near Starcross; two of these I saw in the collection of Mr. Benthal.

No. 1. A very striking variety, having the usual creamy white line on the inner margin of both fore wings black instead of white. It was taken in 1891, and was the fourth specimen captured by Mr. Benthal, who found it flying in his garden; but unfortunately the central wire of his umbrella-net cut off its body, which subsequent search failed to detect. The specimen had evidently been in good condition when captured, but whether a male or female Mr. Benthal did not know.

No. 2. In this specimen the largest of the five black spots which occur on the hind margin of each fore wing was minus. It was the first specimen taken by Mr. Benthal this year. Mr. Benthal said he had seen one having the hind wings *white*. This was in 1891, and being unprovided with a net he managed to place his hat, a "mortar-board," over the insect, which, however, escaped whilst the reverend gentleman was endeavouring to box it, and departed "never to return."

Mr. C. G. Barrett, in his magnificent work, 'Lepidoptera of the British Islands,' does not mention any varieties of *hera*, but says that the first recorded specimen was captured at Newhaven, Sussex, in 1855; and that it was taken at Dawlish in 1881.

During the seven days I was working for this species, I only went out once without getting it; whilst on Tuesday, August 13th, a very windy and showery day, I got eight specimens. This I believe to be the highest number yet taken by one collector in a day. On Wednesday, August 14th, I got six. But these of course were red-letter days.

Other species noticed, whilst at Starcross and in the immediate neighbourhood, were as follows:—*Vanessa io*, *V. atalanta*, *V. urticæ*, *Lycæna agestis*, *L. argiolus* (the latter beaten from holly); *Pieris brassicæ*, *P. rapæ*, *Satyrus ægeria*, *S. megæra*, *S. tithonus* (were very common), *S. ianira*, *Polyommatus phlœas;* full-fed larvæ of *Sphinx ligustri*, *Calligenia miniata* (in fine condition); *Lithosia lurideola*, *Gnophos obscurata* (the dark form), *Ephyra porata*, *Acidalia imitaria*, *A. emarginata*, *A. bisetata*, *Cabera pusaria*, *Aspilates citraria*. I was much astonished at beating out occasionally my old friend *Abraxas grossulariata* in good condition; I had bred some 1200 specimens eight weeks earlier at York, distant 300 miles. *Larentia olivata* (common, mostly worn, although some lovely specimens were seen), *Melanthia ocellata*, *Melanippe rivata*, fine *M. subtristata*, *M. galiata*, *M. fluctuata*, *Coremia unidentaria*, *Cidaria picata* (one specimen only, worn), *Anaitis plagiata*, *Eubolia mensuraria*, *Camptogramma bilineata*, *Phibalapteryx lignata*, *Eubolia lineolata* (common, but worn), *Bryophila glandifera* (a typical specimen at Starcross, and a yellowish form at rest on the sea-wall, Teignmouth), *B. perla* (common), *Xylophasia polyodon*, *Luperina testacea*, *Mamestra brassicæ*, *Triphæna orbona*, *T. pronuba*, *Noctua plecta*, *Phlogophora meticulosa*, *Plusia gamma*.

The insects enumerated above were all either beaten out of the hedges whilst working for *hera*, or else seen on the wing, and none were worked for specially. With the exception of one night at "light," with Messrs. Robson and Mitchell, and another trying to "assemble" with *hera*, I did no night-work, as I had taken very little "moth tackling" with me, excepting what would be necessary for *hera*, which I meant having "coûte que coûte."

In conclusion I wish to thank most heartily Messrs. Brooks, Porritt, and Fenn for much useful information.

York, October, 1895.

OBSERVATIONS ON *EREBIA ÆTHIOPS* (*BLANDINA*).

By J. C. Haggart.

Happening to reside in an extremely favourable locality, I have for the past few years made the study of this interesting northern butterfly an especial one. I think nothing can be more exhilarating to the entomologist than to make an excursion on a fine sunny day in July or August to the domains of this insect.

Immediately after emergence, *Erebia blandina* presents a beautiful appearance, the wings having a lovely velvety bloom on them, almost beyond compare. This fine complexion unfortunately disappears in a few days, however, and tends to greatly reduce the original beauty of the insect.

The haunt of *E. blandina* is almost without exception the margin of a plantation or wood where the different species of the *Poa* grow abundantly, and always situated in such a position as to receive the first rays of the rising sun. This last-mentioned fact is so plainly evident that the least observant cannot fail to notice it. The insect is truly sun-loving, and no collector need go in search of it with any thought of success if the day be dull.

It is most interesting to observe the extreme sensibility of the insect to shine and shade. A very good day wherewith to illustrate this is one when heavy clouds at intervals obscure the sun; the moment it disappears so also does *E. blandina*, and no sooner does it shine forth again than, as if by magic, scores of the insect are on the wing.

The under side of the insect bears a marked resemblance to that of a dead leaf, and I have often watched the males being deceived by withered leaves lying amongst the moss. They would flutter down quite close to the leaf, immediately rise with a disappointed air and fly a little further, only to be deceived again and again.

The ova are deposited amongst the *Poa*-grass and hatch in September. Towards the end of October the larvæ go down and hybernate throughout the winter and spring, coming up to feed again in May; they are generally full-fed about the end of June; the insect appears in July or August.

The larvæ are nocturnal feeders, coming up to feed on the grass just about dusk. The method of procuring the larvæ is by no means enviable even to the most ardent entomologist, as in the uncertain light it necessitates crawling on one's hands and knees amongst the grass, and there is always the risk of grasping those little brown slugs in mistake, which resemble the larvæ very much in shape and colour. No artificial light can be used, as the larvæ immediately drop down amongst the grass if this is done. The only alternative therefore is to use one's eyes to the best advantage until the darkness makes that impossible.

They are not difficult to rear in confinement if the larvæ are kept properly supplied with fresh food.

Galashiels.

ORKNEY LEPIDOPTERA.

On his return from Orkney, Mr. McArthur was good enough to show me the collection of Lepidoptera which he had made there during the past season. Unfortunately I was unable, from want of time, to make a thorough examination of the species in detail, but the following notes on some of the "macros" may not be uninteresting:—

Six species of butterflies were seen. *Pieris brassicæ*, common. *P. rapæ* was seen flying about the streets in Stromness. *Vanessa urticæ*, one specimen was seen on the cliffs at Hoy. *Epinephele ianira*, one specimen taken. *Cœnonympha typhon* (*davus*), rare. *Chrysophanus phlœas*, one specimen occurred at Hoy.

Nemeophila plantaginis.—In the males there is a good deal of variation in the size of the yellow markings on the fore wings, and in the females the yellow on hind wings in many specimens gives place to red with a complete absence of marking on the basal half, this being entirely black.

Hepialus humuli.—The specimens of this species do not vary in the direction of that exhibited by Shetland examples, except that the thorax is rather dark.

Xylophasia monoglypha (*polyodon*).—Only about half a dozen specimens were seen altogether, and of these only one is of the melanic form so frequent in Scotland.

Agrotis vestigialis (*valligera*).—Some of the specimens are richly marked, and the ground colour is rather brighter than in English examples.

A. cursoria. — All the usual forms are exhibited, but the prevailing colour of the fore wings is brownish grey, varying in one direction to whitish grey, and in the other to a reddish brown. In one female example the colour is dark greyish brown with a broadish grey outer marginal border; transverse markings absent.

A. tritici.—Not nearly so common as *A. cursoria;* all the specimens have a subcostal streak, and in a few the transverse markings are very faint. *A. aquilina,* which is sometimes considered to be a form of *A. tritici,* was not represented in the collection.

Noctua festiva.—A very extensive and highly variable series of this species was obtained. Among the numerous aberrations are four remarkable forms. One of these is dark chestnut with a dusky basal patch, central shade, and outer marginal band; the stigmata inconspicuous. Another is brown with grey outer margin. A third specimen is pale grey with a dusky central fascia and band beyond. The fourth is brownish with velvety black spots before the orbicular and between that and the reniform; a blackish shade from reniform to inner margin; also a band beyond.

N. xanthographa.—Only three specimens, one red-brown with a whitish reniform.

Triphæna comes (*orbona*).—The only form observed was the dark one known as var. *curtisii.*

Epunda lutulenta.—A very splendid series of this species was taken, all in grand condition as they were found just emerged from pupa. The grey form with dark fascia (var. *sedi*) is largely represented. Another form is blackish with a darker fascia not always clearly defined.

Tæniocampa rubricosa.—Varies in colour from grey to dark reddish brown; some of the specimens are brown suffused with silvery grey; others are prettily variegated.

Hadena adusta. — Not common. Among the specimens brought back is one example which is almost entirely velvety black.

Larentia flavicinctata (*ruficinctata*).—Only met with in Hoy, where it was rare. The fulvous colour in the specimens is brighter than in Scotch mainland examples.

Thera juniperata.—The majority of the specimens have a black or blackish basal patch and central fascia; the latter is entire. Only a few examples are of the ordinary type.

Hypsipetes sordidata (*elutata*).—A very long series exhibiting an extraordinary range of variation. Many of the specimens fuliginous, but none really black. One curious example is blackish with reddish basal patch and central fascia; on the outer margin there is a conspicuous white spot. Another is olive-brown in colour, with blackish markings consisting of a subbasal fascia, an angulated one beyond, a central fascia bifurcated above the middle and the ends approximating on costa, and a broadish submarginal band. The series was reared from larvæ found feeding on stunted sallows.

Coremia munitata.—The specimens are very suggestive of *C. designata* (*propugnata*) in the style of marking, although the colour is more or less typical.

Melanippe montanata.—In some examples the fascia is exceedingly faint, and the two black spots consequently stand out prominently; but beyond this there is little of importance in the way of variation.

Cidaria truncata (*russata*).—I think I am right in the determination of this species, but it must be admitted that many of the specimens have a very suspicious resemblance to certain forms of *C. immanata*, especially those with a clearly defined black central fascia.

A full list of the Macro-Lepidoptera previously recorded from Orkney will be found in the 'Entomologist,' vol. xxi. pp. 28–30 and 98, 99. The recent additions made by Mr. McArthur are:—*Vanessa urticæ, Epinephele ianira, Chrysophanus phlœas, Agrotis vestigialis, A. cursoria, A. tritici, Noctua rubi, Pachnobia hyperborea, Xanthia citrago, Dianthœcia nana, D. cucubali, Dasypolia templi, Selenia lunaria, Numeria pulveraria, Larentia multistrigaria, L. flavicinctata, Eupithecia pulchellata.*

RICHARD SOUTH.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY'S EXHIBITION.

THE Annual Exhibition of this Society was held on October 17th, at St. Martin's Town Hall, Charing Cross, and was much appreciated by the company who came to see the choice and beautiful specimens which had been tastefully arranged by the Committee.

It may be well to mention that the object of the Society is to popularize the study of Natural History, and to promote this it holds meetings twice a month, at which papers are read, discussions take place, observations are communicated, and specimens shown and commented on. In the summer time, field meetings are held for the purpose of collecting and observing; and periodically, admirable and attractive exhibitions, such as the present one, are promoted. The Society's rooms are at Hibernia Chambers, London Bridge, where a large Library and typical collections are kept for members' reference, as well as a lantern for demonstration purposes. At present the number of members is about 200, and the annual subscription is only 7s. 6d. The Secretary is Mr. Stanley Edwards, Kidbrooke Lodge, Blackheath.

In the British section, the President, T. W. Hall, Esq., exhibited a large and valuable collection of butterflies and moths, including a long series of *Chrysophanus dispar*, now extinct, a series of the rare *Lycæna arion*, a fine series of another extinct fen insect, *Noctua subrosea*, a fine set of *Eupithecia*, and the life-history of *Sesia sphegiformis*. Mr. R. South, life-histories of a number of species. Mr. Hamm, a large number of rare varieties taken round Reading. including a diaphanous *Melitæa aurinia*, a very dark *Lithosia lurideola*, a grand series of *Xanthia aurago*, many specimens of both *Psyche opacella* and *Fumea intermediella*, with cases at different stages of growth. Mr. Jäger, an extremely perfect series of *Callimorpha hera*, with its var. *lutescens* and the intermediate terracotta form, and also a beautiful series of *Spilosoma lubricipeda*, with vars. *radiata* and *fasciata*, and intermediate forms. Mr. H. W. Barker, a fine series of Arctias, and a drawer of several species of Lycænidæ, showing many beautiful variations. Mr. H. Mitchell, a case containing distinct and striking varieties of 14 species, including an entirely fulvous *Epinephele ianira*, a suffused var. of *Vanessa urticæ*, a melanic specimen of *Papilio machaon*, a banded *Chrysophanus phlœas*, and a coalesced form of *Zygæna loniceræ*. Mr. C. H. Williams, a beautiful banded form of *Cheimatobia boreata*, a melanic form of *Oporabia dilutata*, and a specimen of the same species with yellow ground colour. Mr. J. H. Carpenter, his collection of *Argynnis*, *Melitæa*, and *Vanessa*, including white-spotted forms of *Argynnis paphia*, and a male approaching the *valesina* form. Mr. Hy. Tunaley, a case showing the protective resemblance of *Lobophora viretata* to its resting-places on holly stems and leaves. Mr. Hy. J. Turner, some 74 species taken in his garden near Nunhead Station. Mr. McArthur, some fine specimens of Lepidoptera. Mr. H. A. Auld, a bred series of *Callimorpha hera*, a fine series of *Nola albulalis*, and a white var. of *Lomaspilis marginata*. Mr. J. A. Clark, a series of the extinct *Lælia cænosa*, a *Bombyx rubi* without the transverse lines, a white-banded black form of *Abraxas grossulariata*, a striking var. of *Oporabia dilutata* having a very dark band on a very light ground, a uniformly black var. of *Larentia cæsiata*, nearly white specimens of *Lomaspilis marginata*, and a new instrument invented by himself, consisting of a lens on an adjustable arm and stand, to aid in the setting of minute insects. Mr. C. G. Barrett, a long and varied series of Zygænidæ, Nolidæ, Psychidæ, Amphydasidæ, Boarmiidæ, and Zanthias, among which were specially to be noted a complete series of *A. betularia*, and var. *doubledayaria*, with intermediate forms, series of all the rare and curious species of *Psyche*, black *Tephrosia biundularia*, and a fine series of the rare *Nola albulalis*. Mr. Merrifield, a number of species which had undergone changes brought about by artificially increasing or decreasing the temperature during the pupa stage. Mr. R. Adkin, a fine set of specimens taken in the island of Hoy, Orkney, during 1895; an almost complete collection of Sesiidæ, arranged to show their peculiar method of pupation; and a collection of the genus *Triphæna*, including a series of *T. comes*, containing many interesting varieties, especially from N. Britain. Mr. J. W. Tutt, a number of drawers of species from his well-known and large collection. Mr. Chittenden, some very fine varieties of Noctua. Mr. Percy Bright, a grand series of *Hepialus humuli* from N. Britain, containing many remarkable varieties, together with other rare species and forms.

In foreign Lepidoptera there were numerous and splendid exhibits. Mr. A. H. Jones exhibited some very fine bred series of Rhopalocera from South Europe, including *Thais cerisyi* with a very dark female, *T. polyxena* and its var. *cassandra*, *T. rumina* and its var. *medesicaste*, series of *Euchloë belia* and its var. *ausonia*, series of *E. tagis* and its var. *bellezina*, and a very fine series of *Leucophasia duponcheli*, with its summer form var. *æstiva*, all in the very finest condition. Mr. McArthur, a case of East Indian Papilios. Mr. Henry J. Turner, African Papilios and Danainæ. Mr. Leech, a fine collection of Palæarctic Vanessidæ and Argynnidæ; also a selection of Palæarctic Bombyces, Noctuæ, and Geometræ, the series of many of the species comprising specimens from England, and also from Japan and other places in Eastern Asia. Mr. W. A. Pearce, about 150 species of Sphinges, Bombyces, Noctuæ, and Geometers captured by himself in Pennsylvania and Colorado. Mr. W. Mansbridge, many fine Rhopalocera from the United States; the seasonal forms of *Colias eurytheme*, the Papilios, and the protective resemblance of *Anæa andria* to a dead leaf being especial features. Mr. A. Hall, grand cases of Palæarctic and Nearctic Argynnidæ, South American Catagramminæ and Oriental Nymphalidæ. Mr. Stanley Edwards, a large and valuable collection of Ornithoptera and Papilio from all parts of the world. Mr. O. Janson, Ornithoptera and Hepialidæ.

Among the Coleoptera shown, Mr. W. West (Greenwich) sent almost complete series of Cicendelidæ, Carabidæ, and Dytiscidæ, as well as very fine specimens of the genera *Chrysomela* and *Aphodius*. Mr. B. G. Rye, cases containing representatives of the families and genera of British Coleoptera. Mr. O. Janson, a case of the largest species of Coleoptera from various parts of the world.

Mr. T. R. Billups exhibited his inimitable collection of Ants, Bees, and Wasps, a fine set of British Hemiptera, and a large number of life-histories of parasitical Diptera and Hymenoptera with their lepidopterous hosts. Mr. A. Beaumont, a collection of Diptera. Mr. J. T. Carrington, a number of plants having insect-galls upon them. Mr. Auld, a hornets' nest.

Mr. Stanley Edwards kindly lent a series of diagrams showing the life-history of typical species of the various sections of Insecta and Crustacea.

In the Orthoptera, &c., Mr. C. A. Briggs exhibited a collection of the British species, nearly complete, and living specimens of the recently naturalized cockroach, *Periplaneta americana.* Mr. W. J. Lucas, specimens of *Æschna juncea* and *H. cyanea* taken *in copulâ* at Bournemouth. Mr. Ashdown, local species and varieties of *Odonata,* including *Gomphus vulgatissimus* and an intermediate var. of *Calopteryx virgo.*

Microscopes were lent by Messrs. W. West, E. West, F. E. Filer, J. W. Hardy, H. Cooper, A. W. Dennis, W. Turner, C. West, W. Burton, H. G. Coombes, T. W. Brown, and Mrs. Brown, and a number of beautiful objects were shown and much admired.

Mr. R. Adkin showed entomological works; and Mr. A. E. Pearce, a book of designs in water-colours, being studies of plants by himself.

Mr. Enock gave one of his attractive lectures, aided by the lantern, on "Insect Architects," and the musical arrangements were admirably carried out by Mr. W. Latter, R.A.M., and a few friends.—Hy. J. Turner, *Hon. Report Secretary.*

NOTES AND OBSERVATIONS.

Exhibition of the South London Entomological and Natural History Society.—The Thirteenth Exhibition of this Society was held at St. Martin's Town Hall, Trafalgar Square, on Oct. 17th last, and was evidently a great success. Not only was this so as regards the extensive and varied character of the material brought together, which was in the highest degree both interesting and instructive, but also from the fact that the attendance was a large one. On this occasion those on whom the arrangements mainly devolved had a much larger space than formerly at their disposal; but the result proved in a very satisfactory manner that they were quite able to utilise this to the fullest advantage. Entomology, especially the Order Lepidoptera, was well represented, and the Hon. Secretary's Report on exhibits in this department will be found on page 300.—Ed.

Grease in Moths.—This being the greatest trouble I have had with my collection, I have tried nearly every remedy that has been suggested. While studying Dr. Guard Knaggs's remarks on this subject, however, I noted that he considered that grease was practically the result of decomposition, and the thought occurred to me that criminals were buried in quick-lime to prevent ordinary decomposition. Wondering how slaked lime would act, I got some, powdered it up finely, and put it in a box, resting the wings of some "greasy" subjects on it. I covered the bodies, having first cut off a portion of the underside, and extracted as much of the contents as possible. When this was done early it cleaned them better than anything else I have tried, as when the grease is absorbed, and the body is well dried, a camel-hair brush removes the lime nicely, and you can finish off by brushing upwards. The lime does not seem to harm the wings or pins at all that I can see; but unfortunately I have not the time to experiment as fully as I could wish. If lime has not been tried before, I should like some of our professors to try it, and give us the results. It certainly stops the grease spreading any further, saves entirely the unattacked parts, and greatly improves the rest. It is clean, cheap, and easily used; a week being enough for a new subject, older cases take longer.—J. T. Fountain; 58, Darwin Street, Birmingham, Oct. 18th, 1895.

Senses of Insects.—Mr. Jefferys' note on the hearing of insects (*ante*, p. 278) reminds me of an incident that came under my notice which may be worth relating. As I was sandpapering some cork for entomological purposes in the quiet hours of the night some time ago, I saw a cricket, *Acheta domestica*, coming towards me. I stopped sandpapering, the cricket stopped; moved, the cricket ran away; resumed my work, the cricket returned. I repeated it two or three times, and at last it came so near to me that I was able to catch it. From this it seems that although crickets have ears, which I understand are situated in the tibia of the front legs, they are not able to distinguish between the noise made by sandpapering cork and that produced by themselves. This is but a single instance it is true.—F. Milton; 184, Stamford Hill, N.

Pieris rapæ in New Mexico.—I had hitherto seen this in New Mexico only at Santa Fé; but lately Miss Lee showed me an example caught in the vicinity of Albuquerque, she thinks last summer. In this country we look upon a new locality for *P. rapæ* with much interest, while nobody thinks of troubling to run after *Vanessa antiopa*, one of our commonest butterflies.—T. D. A. Cockerell; Las Cruces, New Mexico, U.S.A., Sept. 14th.

A Note on the Lepidoptera of Middlesex.—'Harrow Butterflies and Moths' (vol. i., by J. L. Bonhote and W. C. Rothschild), published by the Harrow School Scientific Society, adds several species not, I think, included in the "Preliminary List of the Insect Fauna of Middlesex" (Entom. xxiv., xxv.), and in my own, and other records, in the 'Entomologist' (xxvii., xxviii.). With a view to further completing the county list, I have made a note of those species which now appear for the first time, though two sets of observations, those of Col. Hanbury-Barclay and Mr. F. Bond, belong apparently to the forties and fifties. Besides these, the authors quote freely from Mr. Melvill's 'Flora of Harrow,' the date of which is given as 1874. Mr. Cockerell also mentions this publication, but the edition he used was that of 1867. Possibly the notices now before me, and not in Mr. Cockerell's list, were made in the intervening years 1867–1874. Of the Rhopalocera Mr. Rhoades-Smith has discovered a locality for *Leucophasia sinapis*, whose claim to rank as a Middlesex insect has hitherto been based upon Mr. Mera's single specimen at Chiswick (Entom. xxiv. 119), while the same collector also reports *Colias hyale* taken in August, 1892. *Thecla rubi* (a single-specimen record) has turned up again at Wealdstone, while *Satyrus semele* and *Melitæa aurinia* have also been caught in the neighbourhood. *En passant*, I am myself glad to supplement a previous notice of *Thecla w-album* (Entom. xxiv. 65) with a second capture this year at the identical spot where it was found in 1887. Among Heterocera the novelties communicated by Mr. Sydney Webb, the possessor of the late Mr. Bond's collection, as taken within the radius of Harrow, are *Hepialus sylvanus* and *Brephos notha.* Those mentioned in Mr. Melvill's book are *Anarta myrtilli* and *Aventia flexula;* while Col. Hanbury-Barclay is responsible for *Calæna haworthii*, *Xylina socia*, and *Hecatera chrysozona.* Of modern interest are *Nola confusalis*, *Lithosia mesomella*, *Asphalia ridens*, and *Agrotis aquilina*, which have fallen to the share of Mr. Rhoades-Smith during the past year or two; *Pœcilocampa populi* (not uncommon), and, most remarkable of all, a single *Bryophila muralis*, taken by Mr. Bonhote on the School Chapel in July, 1892. The first volume ends with the Noctuæ; but a second, dealing with the Geometræ and the rest of the macros, as well as micros, is, I understand, shortly to be issued. Altogether the number of butterflies recorded is forty-one, a very respectable total when it is considered that the localities worked are nowhere more than fourteen or fifteen miles from the Marble Arch. The older entomologists are agreed that Middlesex, entomologically speaking, was once a happy hunting-ground indeed for the London collector. The more ancient of the notices in Newman and elsewhere would appear to support the tradition. But after all our insect fauna to-day compares very well with that of many a county which the jerry-builder and the speculative contractor have not yet converted to the uses of modern civilization. Above all it is most satisfactory to read that insects long since believed to be extinct so far as the north metropolitan area is concerned, still linger with us, and contrive to hold their own.—H. ROWLAND-BROWN; Oxhey Grove, Harrow Weald, Oct. 12th, 1895.

LARVÆ OF ACRONYCTA PSI.—With reference to Mr. Allworthy's note on early larvæ of *A. psi* (*ante*, pp. 229-230), I should like to state that I came across full-fed larvæ of this species on July 4th (one) and July 6th (two). Of these, two pupated the day after I took them, and the other was "stung." On August 15th, 1894, and on August 28th, 1895, I took freshly-emerged imagines of *A. psi*, and a few days ago I saw several larvæ not yet full-fed. These facts would certainly seem to suggest that there is a partial second brood of *A. psi;* I say partial because, firstly, the August imagines are not so common as in May; and secondly, the pupæ from my July larvæ, though perfectly healthy, have not emerged, and are evidently lying over till the spring.—T. B. FLETCHER; 78, Thornlaw Road, W. Norwood, S.E., Oct. 20th, 1895.

AUTUMNAL FEEDING OF THE LARVA OF ARGYNNIS PAPHIA.—In the autumn of 1893 I recorded (Entom. xxvi. 320) the occurrence of the autumnal emergence of *A. paphia.* I am again able to report upon this unusual habit of the species. A large number of ova from a normal female hatched the beginning of last August, and all the larvæ excepting one entered into hybernation immediately, and remain in that state, which is natural to the species. Examining the plant of *Viola* (upon which the brood are confined) on the 13th inst., I was surprised to find a larva in its last stage almost fully-grown, while all the others were hybernating, and the majority close to the shells of the ova. It seems remarkable that certain individuals should divert from the general habit of the species in this way. Are these instances forerunners of a future second emergence which this and allied species will adopt; or possibly they may be lingering examples of a second emergence of the past? I recorded a similar case in the same volume of *A. adippe.*—F. W. Frohawk; Oct. 1895.

Stauropus fagi Double-brooded.—When on a larva-beating expedition in the Poprad Valley in April, 1893, Herr F. Achille obtained a freshly-emerged male of *S. fagi*, but though working with much assiduity no others were met with that spring. In May, 1894, however, in the same district, a female was found which laid fertile eggs, indicating that males had emerged earlier. Sixteen eggs only were deposited, which hatched on the 21st to 23rd of May; and five went into pupa; the imagines duly emerged the first week in August. The author's conclusions as to the normal double-broodedness of *fagi* in a state of nature are borne out by Wirchratski, who found very small and also full-fed larvæ on oak in September, 1884, which pupated and emerged the following spring. It thus appears tolerably certain that *fagi* has normally two broods in South-eastern Europe. (F. Achille, in 'Societas Entomologica,' Nos. 1 and 2, 1895.)—W. M.

Agrotis ripæ, var. obotritica.—The larvæ, which hide in the sand by day, may be obtained at night by searching the food-plant with a lantern. It is to be met with on saline plants, such as *Salsola kali*, *Cakile maritima*, *Atriplex maritima*, &c., in the month of August. During the day the larva may be found by gently scraping away the surface of the dry sand in the neighbourhood of the food-plants. The larvæ are very variable. Although this variety bears considerable resemblance to the type, it may be readily separated from it. *Obotritica* is rather larger in size, and varies from a clear white ground, with scarcely visible markings, to darker, and with more distinct markings. The author mentions that it is still regarded as doubtful whether it is not a distinct species, or even whether several species are not included under the name *obotritica*, an opinion also expressed by F. Schmidt, the discoverer of this variety. (J. Speyer, in 'Societas Entomologica,' No. 3, 1895.)—W. M.

Sugar in 1895.—Having sugared almost every night during June, July, and August in a large garden and shrubbery, I was able to note changes from day to day. Finding the garden very productive, I only worked in the woods about half a dozen times, most of which proved complete failures. Until June 13th insects came fairly well, after which nothing would persuade them to leave the raspberry-flowers, where they swarmed every night until the flowers ceased blooming about the 28th. I have no doubt that honey-dew must also have been attractive about this time, as two nights in the woods resulted in only three insects. On the 28th, in spite of a very high wind and cold rain, sugar was very productive, and continued so until the limes came into flower about July 8th, when scarcely an insect could be found, except by working the flowers. This state of things lasted until the limes were quite over on July 22nd, when sugar was once more attractive, and continued so until I ceased using it on September 4th. Throughout August, sunflowers (which were in close proximity to the sugared trees) attracted many insects, although *Agrotis nigricans* and *Noctua* *stigmatica* (*rhomboidea*) were the only two which showed a decided preference for the flowers.—J. H. D. BEALES; West Woodhay, Newbury, Oct. 14th, 1895.

CANNIBALISM OF THE LARVA OF CERASTIS VACCINII.—Towards the end of May this year, I beat two larvæ of *Cerastis vaccinii* off elm, and kept them in the same pill-box. One of these larvæ was larger than the other, and was preparing to change its skin when I found it, and did so about two days after. And then a tragedy happened: the smaller larva disappeared; the larger must have eaten it up, for the pill-box was a perfectly sound one, so that it could not have escaped. Is it generally known that these larvæ are cannibals?—J. F. BIRD; Rosedale, 162, Dalling Road, Hammersmith, W., Sept. 10th, 1895.

MR. J. E. ROBSON'S SALE CONTINUED.—The concluding portion of Mr. J. E. Robson's collection, including the Geometræ, Crambites, and Tortrices, was sold at Stevens's sale-rooms on the 22nd of October; as the condition of the specimens was poor, prices ruled low. Two lots of *Abraxas grossulariata* were perhaps the pick of the collection; the first, comprising a very fine light variety, with five dark forms, fetched 28/-; the second, some nice light varieties, together with a white-banded black specimen, 32/6. In the *Eupithecia*, two lots, each containing six *Eupithecia consignata* (with others), realised 17/- and 16/-; two ditto of four and five specimens each of *E. stevensata* (with others) from Mr. Sydney Webb 14/- and 15/-. A lot of ninety-six *Melanippe biriviata*, *M. montanata*, *M. fluctuata*, &c., including forms from the Hebrides, made 22/-; and a lot of *Cidaria suffumata*, with var. *piceata* and *porritti*, with two very poor *C. reticulata*, 25/-. Two pairs of Mr. Christy's *Nyssia lapponaria* were also included in the sale, but were, I believe, bought in at 40/- and 42/- respectively.—THOS. WM. HALL.

CAPTURES AND FIELD REPORTS.

EUGONIA AUTUMNARIA, &c., IN KENT.—In September last, while spending a few days at Hythe, I had the pleasure of taking a female specimen of *E. autumnaria* (= *alniaria*), resting on the rail of a street lamp; it has deposited a few eggs. I also met with *Xanthia gilvago*, *Xylina semibrunnea*, and *Polia flavocincta*. At Deal I took one specimen of *Vanessa c-album* on the Michaelmas daisy. *Aporophyla australis* was common at sugar, and *Xylina ornithopus* (= *rhizolitha*) was just appearing.—W. DANNATT: Ivydene, Westcombe Park, S.E., Oct. 10th, 1895.

PHORODESMA SMARAGDARIA EMERGING IN AUTUMN.—On Aug. 31st I went to the Essex marshes for the larvæ of the above species, and among the several dozen which I found was one which appeared to be very large and, as I supposed, nearly full-grown. It pupated on Sept. 4th, and on the 26th the perfect insect emerged. It is interesting to find a larva full-fed in the autumn, as it raises the question whether a second brood may not sometimes occur.—HY. J. TURNER; 13, Drakefell Road, St. Catherine's Park, S.E.

CATOCALA NUPTA IN WORCESTERSHIRE.—While collecting in Wyre Forest, Worcestershire, during the latter part of September, I had the pleasure of taking a specimen of *C. nupta* at sugar. I do not recollect to have heard of this species having been previously taken in Worcestershire.—H. Taylor; 682, Coventry Road, Birmingham.

Catocala fraxini in Kent.—I have great pleasure in recording the capture of *C. fraxini*, male, in the neighbourhood of Folkestone, on the sugar on a willow tree. It is nearly four inches across the wings, and is in fair condition.—W. J. H. Simmons; 68, St. Michael's Street, Folkestone.

Xylina semibrunnea and X. petrificata.—These two species of *Xylina* have occurred at sugar and ivy blossom in this neighbourhood somewhat commonly for the last three years. Can any of your readers inform me whether *X. conformis* has been taken in Great Britain since 1859, and if so, when and where the capture was made, and by whom?—B. S. Chope; Colyford, Devon.

Leucania albipuncta at Folkestone.—On Sept. 7th I renewed my acquaintance with *L. albipuncta* by the capture of a specimen, on sugar, at Folkestone. In six years, 1873 – 9 (omitting '78), I took nine individuals at the same place, but never more than two in a season.—Chas. Oldham; Woodford, Oct. 10th, 1895.

Polia flavicincta in the North.—Mr. Shepheard-Walwyn says (*ante*, p. 281) he found this moth at Scarborough, and believes it is not often met with so far north. The moth is fairly common in my garden here. In most years I find several, and have also bred them from larvæ feeding on various garden plants. I have not observed one this year, but have been from home.—G. J. Meynell; Durham.

Deiopeia pulchella.—Mr. G. C. B. Miesille reports the capture of a specimen about the middle of July, 1894, in the playground of Bedford County School. Dr. F. D. Drewitt records the capture of a specimen this year, which he says " settled at my feet on the golf links near Felixstowe. As if to increase the effect of this startling apparition, the wings remained for a moment partly expanded. They were then closely folded together along a stem of coarse grass, and so became almost invisible. Both in its method of flight and of folding up its wings on a grass-stem it resembled one of the Crambidæ " (' Field ').—F. W. F.

Chœrocampa celerio in Scotland.—Mr. D. Davidson, Dingwall, Ross-shire, records the capture of a fine specimen (' Field,' Sept. 28th).

Colias edusa in Britain in 1895.—

Berkshire.—One specimen was seen in the garden here on June 4th; but I only noticed three in the neighbourhood during August, two being on the 16th and one on the 17th.—J. H. D. Beales; West Woodhay, Newbury.

Devonshire.—One at Bartham, S. Devon, on Sept. 26th; and one at the same place on the 27th.—F. W. Frohawk.

Essex.—I saw several *C. edusa* on Aug. 17th, at Tilbury, flying in company with *Parage megæra.* I was fortunate enough to capture four specimens, all males; they were very fresh on the wing, and in beautiful condition. I also captured several perfect specimens of *P. megæra.* I should like to know whether any one else has seen or captured *Colias* at Tilbury before, as an old friend of mine (an experiened collector), has been there year after year in the month of August, and has never seen a single specimen. On the following Saturday, the 24th, another friend paid a visit to Tilbury, hoping to take *C. edusa* and *P. megæra*, but was not rewarded with even a sight of either. Can any one explain this occurrence?—G. R. GARLAND; 94, Sedgwick Road, Leyton, Essex, Oct. 18th, 1895.

Hertfordshire,—On Aug. 14th I took a fine specimen a mile or two east of Radlett station in Hertfordshire.—A. R. HEATH; Willesden, Middlesex.

Kent.—I caught a fresh specimen at Folkestone on Sept. 7th, and a worn male on the 16th. These were all I saw there during my stay of eighteen days.—CHAS. OLDHAM; Woodford, Oct. 10th, 1895. On Sept. 28th I took two male specimens, one in splendid condition, near here, Some half a dozen specimens have been netted here this season, but I fail to hear of *C. hyale* being seen.—H. WOOD; Old Grammar School House, Catford, Kent.

Norfolk.— During a ten-day stay in the fen district, in August, I observed *C. edusa* on the wing. On the 14th I saw one at South Walsham, and another on the 15th at the same place. I also saw two at Ranworth, an adjacent village, on the 19th. *G. rhamni* was abundant, and I saw and captured *P. machaon* in the lanes.—R. LADDIMAN; 25, Lower Hellesdon Road, Norwich.

Surrey.—On Aug. 18th Mr. W. G. Sheldon and myself paid a visit to Box Hill. *C. edusa* were noted and taken: some half a dozen specimens only, nearly all males; condition fair only. Imagines of *Hesperia comma* were plentiful, but worn.—THOS. WM. HALL; Sept. 12th, 1895. I have lately seen two specimens, male and female, of this species which were taken close to the town, by a young collector living in the neighbourhood, at the end of August last. I believe that two others were seen on the same day, but not captured. — W. GROVER; Kent Villa, Harvey Road, Guildford, Oct. 8th, 1895. To the list of records of *C. edusa* in the 'Entomologist' for September, I have to add several specimens from Surrey. Although by no means so abundant as in 1892, this species has this year occurred much more commonly than usual. The two first specimens of the season were seen on a railway bank near here, by Mr. S. G. Vaughan, in June. On Aug. 19th and 22nd I took two, both males, near Croydon, and in the beginning of September several specimens were taken near here by friends. The last specimen of the season, a fine male, I saw on Sept. 23rd, flying swiftly along a busy Norwood street.—T. B. FLETCHER; Oct. 20th.

Sussex.—I took several specimens of this butterfly in clover-fields near Brighton during August, but they were all somewhat faded. During the last three weeks, however, I have been surprised to find it in large numbers in almost every locality I visited between Brighton and Worthing. I think that there can be but little doubt that there has been an extra emergence, probably owing to the great heat of September; for every specimen, without exception, that I have met with this month has been in exquisite condition. I am informed that numerous specimens have been seen at Rottingdean, to the east of Brighton. Some young friends of mine who were at Niton, in the Isle of Wight, at the beginning of August, found this butterfly in great plenty, as well as the var. *helice*. I may add that I noticed a very fair female at the end of May last, while spending a day at Box Hill, in Surrey.—W. H. BLABER; 34, Cromwell Road, Hove, Sussex, Oct. 21st.

ACHERONTIA ATROPOS IN DEVONSHIRE.—I am pleased to be able to record that I captured a fine specimen of this Sphinx on Oct. 3rd. It came to light about 8.30 p.m. during rainfall, and was in perfect condition. The light was facing S.W., which is generally an unproductive prospect.—B. S. CHOPE; Colyford, Devon.

Acherontia atropos in Shropshire.—Two more full-grown larvæ of this species have been brought to me, the last on Sept. 7th; this went down on the 9th, and pupated successfully. On Oct. 12th another larva was received, but as it had been in a dry box for some days the treatment was fatal to it. This makes the eleventh example I have had, and I have heard of two others this year. Five of the pupæ produced moths. In one pupa the right antenna was deformed; the moth from this was minus the right antenna, and the eye on that side was ill-developed. The dates of emergence were Sept. 29th and 30th; Oct. 15th (two specimens) and 18th.—F. C. Woodforde; Market Drayton, Salop, Oct. 20th, 1895.

Acherontia atropos in Somerset.—On Aug. 13th two full-fed larvæ of *A. atropos* were sent me from Wellington, Somerset, by a brother of mine there. One of them I had preserved; the other pupated two days afterwards. The moth, measuring nearly five inches, appeared on Sept. 25th. The pupa was broken on the part of the left fore wing (evidently caused in its larval state), which I feared would entirely disfigure it; but the only damage done was a hole about the size of a small pencil near the posterior margin. Five were found there altogether, feeding on potatoes in gardens. It is many years since they were seen there before.—F. Milton; 184, Stamford Hill, N.

Acherontia atropos in Surrey.—I had a nice imago of *A. atropos* brought to me this morning, captured alive in an old stable-roof in East Croydon by a local bricklayer. The specimen would have been in perfect condition had not the extreme tip of one wing been slightly rubbed. Its stridulating qualities were much in evidence, and caused no small amount of alarm to its captor. Judging from its condition and autumnal emergence, there can I, think, be no question of its having been bred in the district, as all around South Croydon is a considerable expanse of potato-fields, and doubtless the species would turn up in some numbers if properly worked for in the larval stage.—T. W. Hall; 60 & 61, West Smithfield, E.C., Sept. 21st, 1895. A specimen of *A. atropos* in good condition, 125 mm. in expanse of wing, was taken by me in the evening of Sept. 17th ult., flying at an electric light in Kingston-on-Thames.—W. H. Wollstein; Dorset Villa, Kingston-on-Thames, Sept. 24th, 1895.

Acherontia atropos in the London District.—It may interest some of your readers to know that *A. atropos* has occurred this year in the environs of the metropolis. I have just received a fine healthy pupa of that insect from the proprietor of potato-grounds at Lower Tooting, S.W.; his brother turned it up whilst lately digging the potatoes up. A friend of mine has also had one sent him from the neighbouring parish of Merton, S.W.; this was found in the private garden of a relative living there, and emerged on Oct. 1st.—Ed. G. J. Sparke; Tooting Bec Road, S.W., Oct. 22nd.

Acherontia atropos at St. Agnes, Scilly Islands.—Last month I received a very fine female *A. atropos*, partially alive, from Mr. G. W. Brown, who captured the specimen at rest on the entrance gate leading to the lighthouse, on Sept. 14th; it had evidently been attracted by the light.—F. W. Frohawk; Oct. 1895.

Plusia moneta in Essex.—In Mr. Rickard's most interesting "Observations on *Plusia moneta*" (*ante*, pp. 261, 262), he says, "There does not appear to be any recorded from Essex," &c. I captured a specimen in my garden at Woodford June 2nd, 1893, and exhibited it at a meeting of the

South London Entomological Society on July 13th. A report will be found Entom. xxvi. p. 254.—CHAS. OLDHAM; Woodford, Oct. 10th, 1895.

PLUSIA MONETA IN MIDDLESEX.—I should like to record the capture of *P. moneta* here by myself on July 23rd, 1894, a fine specimen having on that day come into the house to one of the lights.—FRANCIS C. WOODBRIDGE; "Old Bank" House, Uxbridge, Sept. 27th, 1895.

PLUSIA MONETA IN SURREY.—On July 2nd last I took with the net in my garden a specimen of *P. moneta*, and on the following evening I captured one more. This may be interesting, as I do not think the insect has been recorded from so near London.—JOHN BERNEY; The Close, Chatsworth Road, Croydon, Sept. 26th, 1895.

SPHINX CONVOLVULI IN 1895.—The following additional records have appeared in the 'Field':—"Nine or ten were killed by a cat last week" (H. F. O. Kearny, Lochiar, Cork, Oct. 18th). "Since writing to the 'Field' we have increased our captures of this moth to eighteen" (J. F. G., Benacre Hall, Wrentham). "Two dozen last week in August and first fortnight of September, on the Holderness coast" (H. Bendelack Hewetson). —F. W. F.

SPHINX CONVOLVULI IN DEVONSHIRE.—On Sept. 7th last I found a specimen of *S. convolvuli* on the beach of Braunton Burrows, N. Devon.—CHAS. BARTLETT; 62, Woodstock Road, Redland, Bristol.

SPHINX CONVOLVULI IN HERTFORDSHIRE.—On Sept. 26th I had a much-damaged specimen of this moth brought me, which had been captured outside a window here, it having been attracted by a bright light.—S. H. SPENCER; Watford, Herts.

SPHINX CONVOLVULI IN CORNWALL.—On Sept. 2nd I had a freshly-emerged specimen of *Sphinx convolvuli* brought to my home. It had been seen crawling up a garden-fence here, and was put into a small tin box that it might be brought to me. When I opened the box, on my return home, I found that it had managed to effectually spoil itself as a cabinet specimen, owing to the confined space. On Oct. 7th a lad saw another specimen climbing a telegraph-pole, and with the aid of his cap caught it, and brought it to me. One of its fore wings was slit lengthwise, and I deemed it best—as it was capable of flight—to give it liberty. Two of the bindweeds, *Convolvulus arvensis* and *C. soldanella*, are abundant all around.—EDWARD STEP; Portocatho R.S.O., Cornwall, Oct. 21st, 1895.

LARVÆ OF SPHINX CONVOLVULI IN CORNWALL.—From a non-entomological friend at Devonport I received a communication last Saturday morning saying he had, the previous evening, sent off by parcel-post a box containing four large caterpillars, which had been brought to him by a fisherman of Port Wrinkle, Whitsand Bay, Cornwall, a small fishing hamlet a few miles from Looe; they were found feeding on "ground ivy." Hoping they were a good sort, my friend had "rewarded the man, and ordered a further supply if obtainable." Of course I expected *rubi* or something of that sort, but was agreeably surprised: the "ground ivy" in the box was *Convolvulus arvensis*, and the larvæ those of *Sphinx convolvuli*. One, full-fed, went to earth the same afternoon, and was of a pale green colour; another, nearly full-fed, is a dirty white; the other two, one about half grown, the other three-parts, are of the brown type figured in Barrett's book; these three are feeding freely on the larger convolvulus. While fishing last summer with the finder, I, having in mind *Acherontia atropos*, asked him if he remembered finding any large green caterpillars on the potatoes, and when digging his patch to look out. I have been taking a fair number of *Xanthia gilvago* at sugar in my garden here this season.—W. T. Sturt; West House, Queen's Road, Kingston Hill, Oct. 21st, 1895.

Sphinx convolvuli in Dorset.—A member of my family and myself captured, between Aug. 12th last, and the 7th inst., fifty-one specimens of *S. convolvuli*. Four-fifths of these were taken on a border in my flower-garden, measuring about 20 yds. by 1½ yds., in which petunias and tobacco plants were growing; the remainder in a garden close by. The earliest taken were hovering over the petunias, but subsequently the tobacco plants were most attractive. The largest specimen measures five inches from tip to tip of wings, and the largest number caught in one evening was seven. —Jno. P. Hyde; The Grove, Portland, Dorset, Oct. 22nd, 1895.

Notes on Arctia caia.—During the summer I have been breeding *A. caia* in hopes of obtaining a variety. On Sept. 22nd a few larvæ spun up, although others were quite small. The remaining larvæ now scarcely touch their food, and are evidently preparing to hybernate. On Oct. 4th, to my great surprise, a small male emerged in my breeding cage, and on the 7th another male made its appearance. Considering the fact that most of the larvæ have not even pupated, is not this a rather unusual occurrence?—Geo. Stanley Morley; Oakdene, Epsom.

[It is pretty generally known that those who rear *A. caia* often obtain an autumnal emergence of this species, and it is said that variation more frequently occurs among these autumn specimens than is the case among those which emerge at the normal time.—Ed.]

Notes on Hemiptera-Heteroptera.—On June 15th, 1893, whilst sweeping among low-growing herbage at Headley Lane, I took an insect, which I have only lately discovered to be a fully developed specimen of *Mecomma ambulans* (female). This year, at Offley, near Hitchin, on Aug. 17th, I took a fully developed specimen of *Myrmus miriformis;* about nine miles further south, close to Codicot, on Sept. 6th, a specimen of *Berytus crassipes*, together with four specimens of *Neottiglossa inflexa*.—R. M. Leake; 15, Alleyn Park, S.E.

Notes on the Lepidoptera of Salisbury.—Though 1895 appears to have been a bad year for Lepidoptera, we have done fairly well with the Rhopalocera. Heterocera have, as a rule, been scarce. The following are our best captures this season:—At the end of May we took three specimens of *Thecla rubi*, one of *Macroglossa stellatarum*, and one of *M. bombyliformis* in some woods five miles from here. *Argynnis euphrosyne* swarmed in the same place. I have not seen *A. selene* this year. During July I found *A. adippe* very abundant in the neighbouring woods; *A. paphia* was much less common, and *A. aglaia* very rare. I found *Lasiocampa quercifolia* on a brick wall not far from our house. My brother took a specimen of *Vanessa urticæ* lacking the two small spots on the fore wings, and corresponding to the description of the foreign variety *ichnusa*. My sister has also taken *Sphinx pinastri*, and a specimen of *P. brassicæ* having one fore wing bearing the female markings and the other three of the male type. The body resembles that of a male. Among the best Noctuæ taken this season are *Gonoptera libatrix* (Sept. 13th), *Plusia chrysitis* (abundant), and *Polia flavicincta*.—C. M. Gummer; 2, Swayne's Close, Salisbury, Sept. 14th, 1895.

Lepidoptera at Chichester and Neighbourhood.—My collecting did not begin much before the end of May; my first captures being *Hemerophila abruptaria*, *Coremia ferrugata*, and the first brood of *Cilix glaucata* (*spinula*), *Eupithecia exiguata* and *Phibalapteryx vitalbata*. *Melanippe rivata* proved most tiresome from their abundance. *Anticlea rubidata* appeared in my breeding-cage on June 7th, and was met with first on the wing on June 14th—fully a month earlier than usual. When bred in large numbers it will be seen that the insect varies considerably, some specimens having a bronze or brassy tint, some are pale, almost whitish, and whilst the ruddy colour in some is very bright, in others it almost approaches a brown hue. During this month my captures were *Lomaspilis marginata*, *Asthena luteata*, *Melanippe procellata*, *Plusia chrysitis*, *Leucania pallens*, *L comma*, and *Amphidasys betularia*. *Timandra amataria* and *Acidalia imitaria* were both common. The first *Uropteryx sambucata* I saw was on July 3rd. The next day I had the good fortune to capture a fine *Aventia flexula* at Singleton, about six miles distant. *Melanthia bicolorata* (*rubiginata*) appeared early in the month, and in the same lane, where *Inula dysenterica* grows abundantly, *Ebulea crocealis* was common, also *Hemithea thymiaria*. On the 18th of this month I took at Singleton a good variety of *Acidalia aversata*, *Cosmia trapezina*, *Lycæna astrarche* (*agestis*), *Strenia clathrata*, *Lithosia complana*, and *Eubolia bipunctata*. The next day I found *Leucoma salicis* on a wall surrounding some poplars, where at times I meet with the larvæ and pupæ in some numbers. On the 29th *Triphæna interjecta* was captured, and at light *Eupithecia coronata*, *Pyralis glaucinalis*, and *Paraponyx stratiotalis*, *Agrotis puta*, *Cilix glaucata*, and *Pyralis fimbrialis*. On Aug. 1st, *Leucania impura*, and on 16th *Eupithecia centaureata* and *Cilix glaucata* came to light, and larvæ of *Acronycta aceris* were found on sycamore. During this month my visitors to sugar comprised *Amphipyra pyramidea*, *Agrotis puta*, *A. saucia*, *Noctua plecta*, *Apamea didyma* (*oculea*) (very variable, several quite black, var. *leucostigma*), *Cosmia diffinis*, *C. affinis*, *C. trapezina*, *Mania maura*, *Catocala nupta* (abundant). Amongst the *C. nupta* was one with very light lurid wings inclining to yellow; on the right wing particularly, and another with the hind wings a light pink—a very pretty colour. On the 16th a fine *Eugonia fuscantaria* was taken at light, and during the month *Hesperia comma* was met with at Kingly Vale. On Sept. 3rd a *Timandra amataria*, a female, apparently just out from the pupa, was captured at sugar, and several specimens of *Xanthia gilvago*, with the much commoner *X. fulvago* (*cerago*). Two specimens of *Sphinx convolvuli*, in poor condition, and an imago of *Acherontia atropos* were taken in the last week of the month. On Oct. 1st *Xylina semibrunnea*, *Scopelosoma satellitia*, *Orthosia lota*, and *O. macilenta* came to sugar. The miserably cold, wet, and tempestuous weather has quite put a stop to sugaring operations for the present at least.—Joseph Adderson, Jun.

Insects at Light during 1895.—Again I am pleased to be able to set forth, perhaps for the last time since the incandescent gas has just come into vogue throughout Ipswich, the respective merits and demerits of electric light, as compared with those of gas-lamps, as an attraction to insects. I will not again give a full list of Macro-Lepidoptera, as I have in previous years monopolised much valuable space, but merely mention those species not before recorded.

The following have been added to the electric light list:—*Smerinthus ocellatus* (only previously seen), *Chærocampa elpenor*, *Zeuzera pyrina*, *Cossus ligniperda* (female), *Nudaria senex, Leucoma salicis, Dasychira fascelina* (seen), *Lasiocampa quercifolia* (several), *Angerona prunaria, Phigalia pedaria, Boarmia repandata, Cabera pusaria, Aspilates ochrearia, Abraxas sylvata, Hybernia rupicapraria, Eupithecia nanata, Melanippe sociata, Phibalapteryx vittata, Pterostoma palpina, Notodonta dictæoides* (several), *N. dromedarius, Miana fasciuncula, Triphæna pronuba, Noctua triangulum, N. baia, Cosmia trapezina, C. pyralina, Dianthœcia cucubali, Aplecta advena, Rivula sericealis, Pyralis costalis, P. farinalis,* and *P. glaucinalis, Paraponyx strationalis* (common), *Hydrocampa stagnalis, Botys verticalis* and *B. urticalis, Pionea forficalis, Spilodes cinctalis, Scoparia dubitalis* and *S. mercurella, Crambus pinetellus, C. perlellus, C. tristellus, C. inquinatellus, C. geniculellus, C. culmellus* and *C. hortuellus, Ephestia elutella* and *E. kuhniella* (previously only recorded from N.W. Suffolk), *Phycis carbonariella* and *P. roborella, Tortrix podana, T. heparana* and *T. costana, Peronea variegana, Carpocapsa pomonana, Dicrorampha ? plumbagnana, Tinea fuscipunctella, Hyponomeuta cagnagellus, Œcophora pseudospretella, Endrosis fenestrella, Cemiostoma laburnella, Agdistes bennetii* (new to the Suffolk list), *Pterophorus bertrami, P. pentadactylus* and *P. pterodactylus, Alucita hexadactyla.* COLEOPTERA:—*Nebria brevicollis, Pterostichus madidus, Amara apriciaria* (simply swarming one evening), *Harpalus ruficornis* (common), *Agabus bipustulatus* (common), *Illybius fuliginosus* (common), *Creophilus maxillosus, Bledius taurus* (two fine females), *Aphodius rufipes, Serica brunnea, Melolontha vulgaris, Agriotes obscurus,* and *Telephorus fuscicornis.* NEUROPTERA:—*Hemerobius humuli, H. limbatus* and *H. subnebulosus, Sialis lutaria, Chrysopa vulgaris* and *C. septempunctata, Colpotaulius incisus, Limnophilus rhombicus, L. lunatus,* and *L. politus, Halesus radiatus, Triænodes conspersa* (new var.), and *Mesophylax aspersus* (new to Britain). The other orders come far less freely. DIPTERA:—*Tipula oleracea* and *T. varipennis, Culex annulatus, Lucilia sericata, Calliphora erythrocephala,* and *Stomoxys calcitrans,* with, of course, hosts of *Chironomi.* HETEROPTERA:—A single *Astorhinus angulatus,* and a couple of *Corixa striata.* HYMENOPTERA:—Many *Ophion obscurus* and *O. luteus,* with *Paniscus virgatus, P. testaceus,* and *P. inquinatus,* and a single *Athalia rosæ.*

At lamps of various kinds several Macro-Lepidoptera have been added, but the Micros fall considerably short of the preceding list:—*Arctia villica* (at a shop window), *Ennomos fuscantaria, Acidalia promutata, Emmelesia alchemillata, Lobophora polycommata* (new to the Suffolk list), *Thera variata, Leucania conigera, L. comma, Luperina cespitis* (not uncommon in one locality), *Agrotis aquilina, Noctua umbrosa, Triphæna pronuba, Anchocelis lunosa* (not uncommon), *Xanthia gilvago* (not seen since 1893, very common), *Tethea subtusa* (seen), *Polia flavicincta, Hadena dentina, Habrostola urticæ, Herminia tarsipennalis, Pyrausta purpuralis, Scopula ferrugalis, Stenopteryx noctuella, Tortrix podana,* and *T. heparana, Peronea variegana, Dictyopteryx contaminana, Diurnea fagella, Endrosis fenestrella,* and *Tineola biselliella.*

By the foregoing list it will be seen how much greater is the attraction of electric light than that of the ordinary gas-lamp. I hope next year to have experimented upon the new incandescent light, and expect the tables to be completely turned, as it is doubtful whether a moth would reach the centre of the town, having, as will be the case, a cordon of very bright albeit small lights to pass *en route.*—CLAUDE MORLEY; Ipswich, Oct., 1895.

OBITUARY.

Major John A. Still died suddenly while playing at golf on Whitchurch Down, near Tavistock, Devon, on the 23rd September last, at the early age of 47. He was the eldest son of Captain John T. Still, of Castlehill, Axminster, and of Mountfield, Musbury. Major J. A. Still entered the Army as Ensign in the 25th Regt. K. O. B.'s in June, 1867, he resigned when purchase was abolished in 1873. He joined the 3rd Batt. Royal Wiltshire Regiment in 1875, and retired with the rank of Major in 1886. After his retirement he recommenced collecting Lepidoptera, with a view of completing his collection begun while at college before entering the Army, devoting his whole time to that object during the summer, thereby obtaining numerous duplicates, which he distributed with a free hand. He will be missed very much by his numerous entomological correspondents, and by his personal friends so suddenly deprived of his very congenial companionship.—G. C. Bignell.

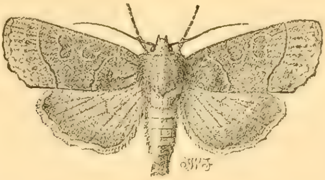
[In a recent letter referring to the late Major Still, Mr. Hodges says:—"I had the pleasure of a week's collecting with him in 1894, and about ten days this year, at his own invitation, in pursuit of *L. arion*, and should like to mention his sportsmanlike and courteous behaviour to myself, an almost complete stranger to him. He had a great horror of modern exterminators, and did his best to keep his locality private from such. His last act on leaving the spot this season was to release six living female *L. arion* which he had previously boxed, so as to ensure leaving some to perpetuate the species." —Ed.]

By the death of William Henry Tugwell, which we briefly recorded in our last number, we lose another of the links connecting the past generation of entomologists with the present, a loss that will be felt by a very large number of friends and correspondents scattered throughout the length and breadth of the kingdom; but most of all, perhaps, by those whose privilege it was to have his personal acquaintance. Born in the quiet town of Reigate, in 1831, he early acquired a taste for the wonders of Nature by which he was surrounded, the chalk downs on the one hand and the well-wooded country of the Tilgate Forest at no great distance on the other, affording opportunities for the exercise of his powers of keen perception, of which he did not fail to take advantage. But his lot was not to continue in such pleasant places, and, having selected as a profession that of a pharmaceutical chemist, he removed to London, and for some years resided in the heart of the City. Even under these circumstances his love of Nature was not allowed to languish. No opportunity of visiting the scenes of his youth was lost, and nothing gave him greater pleasure than on a hard-earned holiday to ramble through Tilgate Forest and Wykehurst Park with the late Tester, under whose guidance he had learned every inch of the ground, in quest of some of the "good things" that were in those days to be found in the district—*Endromis versicolor*, now a thing of the past, among the number. After some years spent in London he removed to Greenwich, where he established a prosperous business; but this necessitated close personal attention, and, with the exception of his regular morning "constitutional," taken before business hours, he had little opportunity for collecting. It was, however, surprising to find the number of species, many of them by no means common ones, that his keen eye detected on the palings and tree-trunks in the immediate neighbourhood of his residence during these short rambles. He also gave much attention to rearing larvæ, and was thus enabled to furnish the life-histories, previously unknown, of many of our rarer species, as well as to enrich his collection with unusually fine series of them. But an opportunity for more extended field work was afforded by the annual holiday; it was on these occasions that his most notable captures were made. He was among the first to detect *Zygæna meliloti* in the New Forest; *Nola centonalis* at Freshwater, and later at Deal; and from the material obtained at the latter locality, to work out the life-history of this species, as well as that of *Acidalia ochrata*. In the same neighbourhood he was fortunate in taking the rare Pyrales, *Mecyna polygonalis* and *Margarodes unionalis;* while from moths taken at Abbot's Wood he added the life-history of *Agrotera nemoralis* to our knowledge. In 1886 he set his heart upon taking *Zygæna exulans*, and having with some difficulty obtained the necessary permission to work the domain in which its highland home was known to be situated, he started north with his intimate friend Lachlan Gibb, and, after some days spent in wandering over mountains, they were rewarded by securing a goodly number of specimens, much to his delight, but not without considerable strain upon his physical power. Although a man of somewhat pronounced opinions, he was an exceedingly pleasant acquaintance, and a true friend to those who enjoyed his confidence, and in the field a most pleasant companion, his intimate knowledge of botany and ornithology adding not a little to the interest and enjoyment of rambles taken in his society. His contributions to entomological literature were frequent, and consisted for the most part of notes of general interest, commencing with the first volume of the 'Intelligencer,' and appearing from time to time in the various journals devoted to the subject, his last appearing posthumously in our October number. He joined the South London Society in 1873, and occupied the presidential chair in 1891, taking an anxious interest in its affairs throughout his membership. Some three years ago he was seized with the distressing spinal disorder which ultimately proved fatal; but although deprived of his powers of locomotion, and in almost continuous bodily suffering, he continued not only to supervise his business, but to follow out his entomological work, so far as the altered circumstances would permit, the rearing of sundry species from the egg occupying a considerable portion of his attention. We learn that his fine, and in some respects unique, collection will shortly be offered for sale. He died on Sept. 20th, regretted by all who knew him, most by those who knew him best.—R. A.

THE ENTOMOLOGIST

Vol. XXVIII.] DECEMBER, 1895. [No. 391.

MESOGONA ACETOSELLÆ, Fab.



The above figure represents a specimen of *Mesogona acetosellæ* taken at "sugar" by Mr. Thomas Salvage on the evening of Saturday, 26th October last, in his garden at Arlington, Sussex, and, so far as I am aware, it is the first recorded occurrence of the species in Britain.

In the earlier part of the present month I had an opportunity of inspecting Mr. Salvage's captures of the present season, and on looking through one of his boxes I detected an insect that I could not identify with any of our British species, and which he told me he had recently taken—in fact, had only removed it from the setting-board that morning. He described its appearance at the time of capture as resembling a strongly-marked *Tæniocampa stabilis*, but could not understand that species being on the wing in the autumn. At my request he very kindly granted me the loan of the specimen until the following day, and on my way home, happening to meet my friend Mr. C. G. Barrett, I showed it to him, and he at once recognized it as *M. acetosellæ*. The specimen is a female, and, with the exception of worn fringe, is in fairly good condition, but from the appearance of the abdomen had evidently parted with her ova before capture.

On the European continent the species has a wide geographical range, extending from Central Russia, through Germany and Switzerland to France, but is said to be somewhat local. The larva feeds chiefly on oak, but is reported also to eat beech and blackthorn, as well as low plants. It is full-fed in May and June, when it pupates in an earthen cocoon, and the imago emerges in autumn. Continental authors place *Mesogona* immediately following *Pachnobia.*

ROBERT ADKIN.

Lewisham, November, 1895.

Description of the above specimen of M. acetosellæ, F.

Female. Primaries greyish brown, finely dusted with black scales principally along the costal and inner margins; the neuration, which is indistinctly defined, is rufous, adding a general reddish tone to the whole surface; there are two transverse distinct whitish curved lines crossing the wing, widely separated on the costal margin, approximating to one-half on the inner margin, the first at basal fourth, edged outwardly with brown, the second running parallel to the hind margin, internally edged with darker brown; these lines enclose the orbicular and reniform, which are slightly darker than the ground-colour, and are clearly and finely outlined with creamy-white; a submarginal series of blackish triangular spots bordered externally with pale crenulations; hind margin crenulated and dark-spotted; fringe ochreous, edged with dark fuscous. Secondaries paler, and inclining to pinkish, with a darker marginal band, and a very indistinct central transverse pale line inwardly edged with dark; hind margin crenulated and wavy; fringe ochreous and rufous. Head and thorax same colouring as primaries; abdomen ochreous; legs and antennæ rufous-brown, latter whitish at base. Expanse 1¾ in.

F. W. F.

A NEW CLASSIFICATION OF LEPIDOPTERA.*

AMONGST the numerous works of a more or less systematic and scientific character which have recently appeared or are appearing on the British Lepidoptera, Mr. Meyrick's 'Handbook' is entitled to a foremost place. It is handy as regards size, not one of the least qualifications for a handbook, moderate in price, complete in regard to containing all our well-authenticated species, convenient to the learner in its tabulations of families, genera, and species.

In order to secure some of these advantages, it is compressed and abbreviated to a degree; repetitions are severely avoided, so that, unless one looks in the right place, an omission of some important character may be wrongly surmised, but, so far as we have tested, no obscurity is caused by these devices, whilst handiness is immensely increased. To those of us whose first definite ideas of Lepidoptera were obtained from Stainton's 'Manual,' and who find it difficult altogether to outgrow our early lessons, the considerable changes in nomenclature are not at all attractive; but we must give as graceful an acquiescence as we can where they are shown to be right, and therefore necessary. To the young student the system of nomenclature will present no greater difficulties than any other would have done. The amount of good, sound, accurate work on the part of the author must have been very great, as he tells us that all structural characters have been verified by his own observations.

---

* 'A Handbook of British Lepidoptera.' By Edward Meyrick, B.A., F.Z.S., F.E.S., &c. Macmillan & Co., 1895.

We have little doubt that the book will be the Handbook of the working lepidopterist in the same manner as the 'Manual' has been for a third of a century. It is for this reason that we think it desirable to consider whether the classification adopted, and now "fully published for the first time," is sufficiently sound and correct to be adopted, for perhaps another third of a century, without any reservation.

We find that the classification is based almost entirely on the neuration; other characters are mentioned in the descriptions, but are usually severely neglected as grounds of classification. It is undoubtedly true, as advanced by Comstock, that any one character may be made use of for classification, and must give correct results if correctly observed and fully understood; but it is precisely here that the study of a solitary character fails; similar modifications occur along parallel lines that are nevertheless widely divergent phylogenetically; very slight modifications will occur over a large area in some families: great modifications within the limits of a genus within others, and so on. These difficulties can only be overcome by frequently considering many other characters, and using them to enable us to interpret the meaning of the one we have selected. The result is that a classification based on one structural point gives us, to take a botanical parallel, a Linnean and not a natural system, and has a mechanical rather than a scientific character. In the work before us there is evidence that this is the case, although the cases in which a true result is reached are of course very numerous.

It is a pitfall for the neurationist that the characters he adopts, especially when he limits them as our author does, lend themselves to easy observation and simple numerical tabulation. The limitation our author makes is a very curious one, and throws over so weighty (phylogenetically) a feature of neuration as to surprise one very much.

This very important feature in the neuration of the Lepidoptera, which is several times referred to, but, so far as we can see only to be dropped as of no importance, is the gradual formation of the cell; the cell cannot be said to exist in the Palæo-lepidoptera (Packard), but is a most definite feature in the higher Neo-lepidoptera (Packard). Had our author paid due attention to this, we think he would have agreed with Packard, Dyar, and others in the position to be assigned to several of the lower families, and would never have given us so unnatural a group as his Psychina. By the way, we may say that the book not being one to be read straight through, we may have missed something, but, so far as we have noticed, our author absolutely ignores Dyar's work on the larval tubercles. In *Hepialus* the formation of the cell has already made definite progress, and so, treated from a neuratimal standpoint alone, it is possible to place *Hepialus* in the Neo-lepidoptera and separate it from the Micropterygides. Amongst British forms we find the next stage in *Zeuzera*, and our author, with his large acquaintance with exotic forms, is no doubt able to supply some of the intermediate positions; and we pass on without any great hiatus to *Cossus*. In several higher groups, and especially in many Tortrices, certain records of the later stages of the process remain. A similar evolution may be traced in the Tineid Stirps. Our author, however, ignores all this, and pays no attention whatever to the neuration, except that outside the cell.

Supposing the maxillary palpus had been taken as the structure on which to base a classification, we might then have started with the Palæo-lepidoptera, progressed through certain Tineina, reached the Pyrales, and then might have placed the Hepiali above these. This illustrates the absurdity of treating a single character in a mechanical or Linnean manner, and serves to show the importance of handling your one structural character in a proper way. It serves also to show, as might be shown from half a dozen other characters, that *Hepialus* belongs to the Neo- and not the Palæo-lepidoptera, and that a wide gap exists between *Hepialus* and *Micropteryx*, a gap vertically as well as laterally. Different forms of the lowest Neo-lepidoptera have retained, in different degrees, different characters of the Palæo-lepidoptera. *Hepialus* happens to have retained especially certain wing characters, but they have diverged as regards maxillary palpi and some other imaginal characters, such as ocelli and tibial spurs, both characters which are up to this point in a very unfixed state; they have also largely diverged as regards larval and pupal characters. A larva with well-developed prolegs, and a pupa with so many parts well fixed, cannot belong to the Palæo-lepidoptera. It would be quite as correct to place Heterogeneidæ in the Micropterygides (Palæo-lepidoptera) because all (1—7) the abdominal segments of the pupa are free, as to place *Hepialus* there because it retains the jugum and additional veins to the hind wing.

There seems to be a great probability that the Psychidæ and the Heterogeneidæ (Is this final, and are we to drop Limacodidæ, Apodidæ, Cochliopodidæ, and sundry other names with which this family has been so lavishly endowed?) have separate origins from lost families of the Palæo-lepidoptera, and that from *Micropteryx* the Adelids, Tineæ, and those forms that largely preserve the maxillary palpi arose, whilst a separate branch took origin probably from a lost family of the Palæo-lepidoptera, and early lost the maxillary palpi, keeping them for some time in the pupa. This is the Hepialid, Zeuzera, and Tortrix Stirps. A more complete discussion of the neuration, especially with reference to the evolution of the cell from the system of nearly parallel or rather radiating veins of the Palæo-lepidoptera, will probably lead to conclusions very similar to these, which are reached on other grounds.

The group of the Psychidæ (including Talæporia, &c.), which no one who has examined the larvæ and pupæ, and the various stages of the degradation of the female to complete limblessness can doubt to be a thoroughly natural one, possibly divisible into subfamilies, but still fairly homogeneous, is treated in a remarkable way. Psychidæ is reduced to two species, and forms the leading family of the Psychina; the remaining species are placed beside Talæporia, which is left in its old place beside the Tineæ. The one group is stated, however, to be derived from the other, so that there is an appearance of hunting with the hounds and running with the hare.

Our author also states *Ocneria* to be derived from *Psyche*. Eggs, larvæ, and pupæ, and in most characters the imagines, so thoroughly contradict this, that we had always attributed this statement, when we had previously met with it, to the extraordinary likeness there is between *Orgyia* (say *antiqua*), (some exotic species have even more maggot-like females, &c.) and *Psyche* (say *unicolor* or *villosella*) in the imago state, in both sexes, due to no community of origin, or identity of structure, but to adaptation to almost identical habits.

We must refer to the impossible position given to *Nola* and *Earias*, whose ova are sufficient to divide them abundantly from the Arctiidæ, even if the larvæ and pupæ did not so strongly differentiate them. We agree with his statement that "they are sufficiently isolated to make their origin at present undecipherable:" why did he not act on this? The grouping of species in genera is often very contrary to our prepossessions, often apparently quite justly, however; but others are very difficult to accept, such as *exoleta* and *viminalis* in the same genus (*Polia*) with *chi* and *aprilina*. Any one who has reared any of the Heliothidæ will refuse to accept *umbra* as a *Caradrina*, along with *trapezina, petasites, hellmanni, morpheus, exulis*, &c., with *Nonagria* and half a dozen other genera between it and *Heliothis*.

If space permitted, we might quote many similar cases; we will only, however, refer to *Lampronia capitella*, which is placed (with *ochlmanniella*) at the commencement of *Tinea*, with *arcuatella*, *cloacella*, *pellonella*, and other true Tineæ, and separated from *Lampronia* by half a dozen genera of the *biselliella*, *tapetzella*, and *ochraceella* groups. There is no more natural generic group than the Lampronias, of which we are acquainted with the early stages of *quadripunctella*, and have bred *rubiella* and *capitella* from the egg. The generic characters given for *Lampronia* and *Tinea* are absolutely identical, but we fancy there is a misprint, as *Tinea* is said to have seven to costa in the diagnosis, but in the table it is given seven to termen. If this is the character which separates them, then we can only say, that the results it leads to prove, not that *capitella* is a *Tinea*, but that the character that would make it one is actually, and probably essentially, a wholly untrustworthy one.

We are not so sure about anything as our author appears to be about everything, and there are limits to our space, or we should state our reasons for disagreeing with the position, amongst others, of Arctiids; still more of *Pterophorus* and *Sesia*. We say "appears," because no doubt much of the dogmatic cocksureness, that ruffles one a little sometimes, is due to the definiteness and brevity that we have found so highly to be praised from several practical points of view.

There are several things that are contrary to tradition that are undoubtedly sound, such as placing *Brephos* and *Thyatira* with the Geometræ, *Cossus* and *Exapate* in the Tortricina &c.

Excellent as the book is, and most useful as we expect it to be, the predominance of a Linnean character in the arrangement is what most impresses us. No doubt this will be most useful to our younger students, as a stimulus to them to labour to set it right.

T. A. C.

ON THE VERTICAL DISTRIBUTION OF THE RHOPALOCERA IN THE ALPS.

By W. Harcourt-Bath.

Contrary to that which is the case in this country, in the Alps Rhopalocera permanently reside at all altitudes upon the mountains as far as the upper limits of phanerogamic vegetation. The causes of this are not far to seek. In the former area the elevations which are of any considerable altitude are isolated and detached, and only contain a small extent of surfaces belonging to the upper zones; moreover, the vegetation is comparatively poor in species. The climatal conditions also which prevail are very unfavourable to Rhopalocera, consisting of excessive precipitation and insufficient sunshine, though, even if this were reversed, the non-presence of surrounding higher peaks, which would afford the lesser elevations protection from the wind, would cause the insects to be all blown off their treeless summits in no time. The paucity of species of Rhopalocera in the principal mountainous districts in the British Isles supplies the direct cause for their great scarcity at any considerable elevation; 1000 feet above the sea-level seems to be the highest vertical limit beyond which the majority of species do not ascend in this country.

In the Alps all the circumstances are very different; everything, in fact, is favourable to the existence of Rhopalocera, the absence of their pabula constituting the chief barrier to their upper extension upon the mountains. Several species are accordingly known to exist even above the line of congelation, among the snow, wherever small patches of vegetation can secure a roothold among the rocks. Thus, upon the summit of the Gornergrat, in the Pennine chain, at an elevation of over 10,000 ft., I have encountered one species, namely, *Erebia glacialis*. Several odd specimens of the Vanessidæ have been seen at higher elevations still, but they are only wanderers to those altitudes, and do not undergo their transformations there.

The lower zones in the Alps of course contain the greatest number of species, and the higher one ascends the fewer will they become.

One of the most familiar butterflies in the region in question is the handsome *Papilio podalirius*, which is pretty plentiful in most of the lower valleys, but does not attain to any great elevation among the mountains, about 3800 ft. above the sea-level being the highest altitude at which I have observed it. *P. machaon*, which, however, is more local and generally less common, ascends a few hundred feet higher, often occurring among the pine woods of the lower alpine zone. The beautiful large crimson-ringed *Parnassius apollo* is one of the most conspicuous butterflies of the lower mountain region, and is also, on account of its plentifulness, perhaps the most typical species in the Alps. It occurs between the altitudes of 3000 and 6000 ft. I have found it a little below the first-named figure at Stalden and Aigle in the Rhone Valley, in the upper portion of the vine zone, but in general it is not seen until this has been passed. Its upper limit terminates amidst the forests of conifers. The closely allied *P. delius* is much more local and scarce, and its area of distribution is also considerably more circumscribed. Its lower limit slightly overlaps that of the preceding species, but its upper limit extends beyond the pine woods into the upper alpine region occupied by the rhododendron and charming alpine plants, which give forth such an array of bright-coloured flowers in the summer time, affording abundant pleasure alike to the tourist and the scientific traveller. This species sometimes reaches an altitude of close upon 8000 ft., at which height I have seen it upon the Riffel Alp near Zermatt.

Of the *Pieridæ*, *Aporia cratægi* and *Pieris brassicæ* ascend to 5500 ft. into the pine woods, while *P. rapæ* and *P. napi* with its alpine variety *bryoniæ* may be seen on the wing nearly 1500 ft. higher, stray specimens occurring above the forest region. The beautiful *P. callidice* I have seen in abundance at an elevation of nearly 8000 ft. on the Gemmi Pass and on the Riffel, and a few individuals more than 1000 ft. higher still, among the snow. *Euchloë cardamines* does not ascend beyond the shelter afforded by the woods, but its relative *E. belia* var. *simplonia* occurs above this region to the height of over 7500 ft. *Leucophasia sinapis*, which is very abundant in the Alps, is found to the altitude of 5500 ft. *Colias hyale* and *C. edusa* may be seen everywhere up to the region of the conifers, the former rarely ascending into the upper alpine zone, where, however, its relative *C. phicomone* is exceedingly abundant in certain localities in company with the rich yellow *C. palæno.* I have seen both the latter species at an elevation of about 8000 ft. in the Pennine Alps. *Gonopteryx rhamni* I have observed no higher than 3000 ft. in the Bernese Alps and Jura.

Of the "coppers," *Chrysophanus hippothoe* is the most plentiful, occurring in abundance, especially in the pine woods, within which the lovely *C. virgaureæ* also dwells. The Lycænidæ are very numerous in species, and considerably in evidence everywhere. *Lycæna bellargus*, *L. corydon*, *L. icarus*, *L. damon*, *L. hylas*, *L. escheri*, *L. eros*, *L. ægon*, and *L. astrarche* are all found in the pine woods, but do not, I think, ascend higher. *L. semiargus*, *L. minima*, *L. arion*, *L. orbitulus*, and several others are, however, found above this elevation, while I have only seen *L. argiolus* in the lower valleys.

The "Fritillaries" are exceedingly plentiful in the Alps. *Argynnis adippe*, *A. paphia*, and *A. dia* I have not seen above the height of 4000 ft., but *A. niobe* with its variety *eris*, *A. aglaia*, *A. euphrosyne*, *A. amathusia*, *Melitæa phœbe*, *M. athalia*, and *M. dictynna* are all plentiful in the pine region; *Argynnis pales*, *Melitæa cynthia*, *M. aurinia* var. *merope*, and *M. parthenia* var. *varia* occurring still higher, in the upper alpine zone. *Melitæa didyma* and *Argynnis lathonia* have their head-quarters in the vine district, but stray specimens may occasionally be met with in the region of conifers.

Of the Vanessidæ, *Vanessa io*, *V. antiopa*, *V. c-album*, and *V. polychloros*, according to my experience, are confined to the lower valleys and slopes, but *V. atalanta*, *V. cardui*, and *V. urticæ* range high up upon the mountains, the latter species putting in its appearance almost everywhere.

We now come to the *Satyridæ*. *Melanargia galatea* swarms in most meadows up to the height of 3000 or 4000 ft., in company with several species of the extensive genus *Erebia*, of which *E. blandina* is the most abundant in the lower mountain region; but as soon as we ascend to the pine woods many other species commence to occur, especially of the group closely allied to *E. epiphron*, while others continue to exist up to the line of congelation, among the latter being *E. lappona*, *E. tyndarus*, *E. gorge*, and *E. glacialis*, the abundance of some of them giving the upper alpine zone quite a distinctive character of its own. Of the typical genus *Satyrus* the three most familiar species are perhaps *Satyrus hermione*, *S. semele*, and *S. cordula*, which are all more or less plentiful in certain localities, but do not, I think, ascend beyond the upper limits of the belt of deciduous trees, namely, about 4000 ft. *Pararge mæra* and *P. hiera*, however, occur among the conifers, in company with *P. ægeria* var. *egerides* and *P. megæra*. *Epinephele ianira* and *E. hyperanthes* swarm everywhere up to the elevation of 3000 to 4000 ft.

The little *Cœnonympha pamphilus* does not appear to be very abundant in the Alps, although it occurs up to an altitude of about 6000 ft. Its place seems to be occupied by a closely allied species, namely, *C. satyrion*, which occurs in great plenty in the pine woods in certain localities, and even extends its area of distribution to the upper alpine zone. *C. arcania*, of which the preceding is supposed by some authorities to be merely a mountain variety, reigns supreme at lower elevations.

The Hesperiidæ are comparatively numerous in species in the Alps; all the British species of this family, with the solitary exception of *Hesperia actæon*, I have found more or less commonly up to the region of the conifers. A large handsome species, *Spilothyrus lavateræ*, occurs, but only singly, on the lower slopes of the mountains up to about 4000 ft., in company with several species of the genus *Syrichthus* closely allied to our own *S. malvæ*, while *S. alveus* I have seen at an elevation of over 8000 ft. in several parts of the alpine range.

The preceding is by no means a complete list of the Rhopalocera which are found in the Alps, and is only intended to furnish an account of the more familiar forms which occur at the various altitudes, and which may be met with almost every season by every one who cares to undertake a trip into the region in question.

Now, in order to intelligently study the vertical distribution of the Rhopalocera in the Alps, it is necessary to adopt a series of vertical or ascending zones. These supply a much more convenient means of tabulating their occurrence at the various elevations than mere absolute altitude above the sea-level, as the climatic and phanerogamic conditions vary so much in different parts of the range, often on account of purely local circumstances, that figures are frequently very misleading. As the result of my own independent observations, I have been enabled to propose the series of vertical zones given on page 327. They are practically the same, however, as those defined by Messrs. Speyer in their excellent work on the 'Geographical Distribution of the Swiss and German Lepidoptera.' The only differences are, first, the addition of the olive zone, which occurs on the south side of the Alps, namely, in sheltered valleys at the foot of the Maritime, Pennine, and Lepontine chains; and, secondly, the division of Messrs. Speyer's lower region into those of the vine zone and lower hill zone respectively. These two additional zones are necessary on account of the unfair value which is attached to Messrs. Speyer's lower zone; besides, they represent two very important climatal belts,—the olive zone terminating polewards at the annual isotherm of 54·5° F., and the vine that of 50° F. This arrangement harmonises with that given in my article "On the Vertical Distribution of the British Lepidoptera" (Entom. xxvii. pp. 2, 27), to which I beg to refer the reader who desires to know the British equivalents for the vertical zones in the Alps, also their mean annual temperature.

The olive zone is very well defined in the Alps, and receives its greatest development on the south side of the Maritime chain in the Gulf of Lyons and the neighbourhood of Nice; but there are several spots where it occurs also in the Pennine and Lepontine chains, especially at Bellinzona in the canton of Ticino, where the land sinks to the comparatively low elevation of 646 ft. above the sea-level. The vine zone is also clearly defined, but the boundary between the one above, namely, the walnut or lower hill zone and that of the beech or upper hill zone, is very difficult to discern, except to an experienced botanist. All the other zones are, however, easy to identify by reason of the very distinctive character of their vegetation. In some parts of the Alps, though, I may here observe, on account of the ruthless destruction of many of the more extensive forests of deciduous trees the conifers have taken their place, and thus frequently occur at a lower elevation than the proper region to which they belong. The character of the accompanying vegetation will, however, help one to determine the zone with sufficient accuracy for our purpose.

The olive zone is the equivalent of the warm temperate region of the horizontal isotherms, while the vine, the lower hill and the upper hill zones represent the cold temperate region; the lower alpine, the sub-arctic; the upper alpine, the arctic; and the snow zone, the polar regions, respectively. By means of the preceding table the entomological student, who only possesses a rudimentary knowledge of botany, may be able to tell at a glance the particular zone that he is in by the general aspect of the vegetation by which he may be surrounded. For the list given I am indebted to the admirable and learned compilation on the 'Natural History of the Alps,' by that veteran traveller I. von Tschudi. As regards the scientific importance of a knowledge of the vertical distribution of the Rhopalocera, and its value in studying their origin, geographical distribution, and morphology, these are themes with which I propose to deal in some future paper on the same subject.

Table illustrating the Vertical Zones in the Alps, with their characteristic Vegetation and average Elevation above the sea-level.

Vertical zone.	Characteristic Vegetable productions (upper limits).	Pennine and Lepontine chains. South side.	Alps of Valais.	The Grisons.	Alps of Berne, Uri, Glarus, St. Gall, and the Tyrol.	The Jura.
Olive zone ..	Olive, orange, lemon, rice	Up to 800 ft.	—	—	—	—
Vine zone ..	Vine, maize, tobacco, apricot, peach, quince	Up to 2600 ft.	Up to 2650 ft.	Up to 2500 ft.	Up to 1800 ft.	Up to 1600 ft.
Lower Hill zone (or walnut zone)	Walnut, sweet chestnut, white mulberry, damson	Up to 3600 ft.	Up to 3500 ft.	Up to 3450 ft.	Up to 2900 ft.	Up to 2900 ft.
Upper Hill zone (or beech zone)	Beech (upright), cherry, chicory, wheat, pear, hemp, oak, buckwheat, yew, apple, lime, juniper, elm, ash, black poplar, bean, millet	Up to 4750 ft.	Up to 4500 ft.	Up to 4500 ft.	Up to 4000 ft.	Up to 4200 ft.
Lower Alpine zone (or pine zone)	Sycamore, barley, rye, oats, larch, cedar, potato, cabbage, silver fir, aspen, summer rye, turnip, flax, mountain ash, birch, silver-leaved alder, hawthorn, spruce fir	Up to 7600 ft.	Up to 6650 ft.	Up to 7050 ft.	Up to 6250 ft.	Up to 4750 ft.
Upper Alpine zone (or rhododendron zone)	Alpine alder, rhododendron, whortleberry, bilberry, alpine juniper, dwarf pine, gentians, saxifrages, primulas, &c.	Up to 8000 ft.	Up to 7500 ft.	Up to 7500 ft.	Up to 7500 ft.	Up to 7000 ft.
Snow zone ..	(Line of congelation) ..	9000 ft.	8500 ft.	8500 ft.	8500 ft.	—

Birmingham, October 20th, 1895.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. de Vismes Kane, M.A., M.R.I.A., F.E.S.

(Continued from p. 274.)

Cirrhœdia xerampelina, *Hb.*—Rare, but apparently distributed widely; though I have no southern localities. Belfast, one; Castlewellan Park, two, Co. Down (*W.*); Dundalk, Castle Bellingham (*Thornhill*), and Drumcar (*Rev. Harpur Crewe*), Co. Louth; Enniskillen, a few (*S.* and *Capt. Browne*); Killynon

(*Miss R.*), Co. Westmeath; Courtown and Greystones, Co. Wicklow; Bessborough Park, Carrick-on-Suir, two; Markree Castle, and elsewhere near Sligo, rare; Clonbrock and Ardrahan, Co. Galway, scarce.

Tethea subtusa, *Fb.*—Bred by Capt. Browne from larvæ taken near Enniskillen.

Calymnia trapezina, *L.*—Found in widely scattered localities, but singly or in sparse numbers. Irish examples are usually characterized by pallid ochreous (rarely reddish) coloration and faint marking. Some from Markree and near Sligo are greyish fuscous, with well-marked fascia and lines. The pale outlines of the two stigmata in these are visible. I have a curious aberration from Clonbrock, bearing a dark longitudinal streak joining the lower ends of the two stigmatal areas, which are not, however, outlined. Single or occasional examples have been taken in the following places:—Near Dublin; Tinahely, Co. Wicklow (*Bw.*); Rockview and Killynon, Co. Westmeath, well marked and sometimes not scarce (*Miss R.*); Armagh (*J.*); Castle Bellingham (*Thornhill*); Drumreaske, Co. Monaghan; Favour Royal and Stewartstown, Co. Tyrone; Hollybrook, Markree Castle, and Sligo; near Derry (*C.*); Glenarm and Ballycastle, Co. Antrim; Killarney, &c., Co. Kerry; Clonbrock, Co. Galway, not rare.

Calymnia affinis, *L.*—Very rare in Ireland, although common in the sister country. Single examples have been taken at Powerscourt (*B.*); Rathfarnham, and Howth (*G. V. H.*), Co. Dublin; near Derry (*W. E. H.*); Clonbrock, Co. Galway (*R. E. D.*).

Dianthœcia luteago, var. barrettii, *Dbl.* — Mr. Birchall records as follows:—"This fine insect, discovered at Howth by Mr. Barrett in June, 1861, and described by H. Doubleday in the 'Entomologists' Annual' for 1864, p. 124, is not known to have occurred either in England or upon the Continent. Four specimens have been captured: the first, a male, by Mr. Barrett, and the others, one male and two females, by myself." Subsequently Mr. Buckler procured some ova and bred a specimen of the imago (E. M. M. Aug. 1879). His careful and accurate account of the larva and its habits, published by the Ray Society, 1895, leaves nothing to be desired. The figure is excellent, but perhaps the dots are too strongly given, as these disappeared in the specimens I have had when nearly full-fed, and the hairs are scarcely to be seen with the naked eye. The dorsal circulatory canal and that of the intestine show more clearly in some individuals than others. In the very young larvæ the second segment bears a dark patch, which grows fainter and more suffused as it gets older, until in the full-fed caterpillar it is of a honey-yellow tinge, without definite outline. The ovum is of a honey-yellow, nearly globular, but somewhat flattened equatorially, and has a depression at the apex. Under the microscope it is seen to be covered with minute pittings, like the top of a thimble, arranged in lines radiating from the apex. The larvæ are discernible within the pellicle on or about the eleventh day, and emerge the following. I placed some eggs in a flower of *Silene maritima*, on which the young larvæ, when hatched, crawled about. Two were then removed to a leaf, upon which they crawled down to the axil and commenced to burrow into the joints. It is unnecessary to supplement Mr. Buckler's description further, except to say that I noticed that if a larva exhausts a rootlet, and is short of food, it will rise to the surface of the earth, wander among the foliage, and feed upon the shoots where they enter the earth until it has found a new supply of root-provender. When disturbed (which is only injurious in the very early stage), it will curl its head round to the tail, and jerk itself from side to side. According to the abundance of food the larvæ mature irregularly. For instance, on Sept. 23rd I had three pupæ and six larvæ of uneven sizes, and on October 3rd three larvæ were still left. The pupa is of paler yellow than that of *D. capsophila*, and proportionally is larger and stouter in the thoracic half; but the abdomen is somewhat more elongated, and the segments more deeply divided, terminating in a forked spike. The wing-cases, legs, and antennæ form at their extremity a projection which is quite free from the abdomen, which appears to be a character common to the Dianthœciæ, but is more salient in this species than in any I have knowledge of. Pupation often takes place close to the food-plant, but sometimes the larva wanders about for a while, and then pupates close to the surface. Usually the adjacent particles of earth are connected together by a very slight film of threads, but sometimes no definite cocoon is formed. In *D. capsophila* similar habits obtain, but the cocoon is much more firmly bound together. The moth often is very active and fidgety on emergence, and the wings expand in about fifteen minutes, and are at first of a purplish tinge on the blacker portions, which fades after. That it is an isolated maritime form of *D. luteago* I am now quite convinced, though no trace of the bright ochreous colour of the type has been preserved. In one example, however, on emergence, a faint yellowish tinge was noticeable, especially in the claviform stigma, which faded in a few weeks. Graslin found the larva of the type feeding in the stems and roots of *Silene inflata*, and he describes it as constructing a cocoon of earth fastened together. There is a variety *argillacea* from the Ural and S. Pontus, "viel dunkler" (*Hoffmann*), "multo obscurior," Stgr., which I have not seen. *D. luteago* is found rarely in S. Germany, and also occurs in Switzerland, S. Russia, Italy, and Corsica. It is very rare in France, Paris, Montpellier, Hyères, Indre, Saone-and-Loire

(*Berce*). The light-yellow type therefore occurs for the most part in inland continental localities, whilst the melanic var. *barrettii* so far is only known from the coast-line of Great Britain and Ireland, namely, Howth and the coast of Waterford, Portjack and Onchan Bay, Isle of Man (*Gregson*, 'Brit. Naturalist,' Feb. 1892), Ilfracombe, Cornwall, and Pembrokeshire. A specimen from the latter locality, in the cabinet of Mr. Barrett, is small and dark, with very indefinite stigmata and markings. This is the only British example I have seen, but I believe none vary in the direction of the typical coloration. A parallel instance of melanism under similar influences is presented by the next species. We are led to the inference that with certain species, and possibly certain genera, a maritime environment is conducive to obscure coloration. Further instances of similar nature will be referred to in due course. The emergence of *D. luteago* is given by Hoffmann ('Die Schmetterlinge Europas') as May and August. Berce ('Faune Ent. Fr. Lépidoptères') gives May, June, and August. Apparently therefore it has two periods of emergence. Var. *barrettii* flies from the beginning of June to the close of July, and is usually to be taken flying to the flowers of *Silene maritima* at dusk, or occasionally settled after dark, probably in the act of oviposition. But it likewise may be taken by lamp-light, dashing up to the illumination, and as rapidly retreating without resting. The flight is extremely swift, and it requires a keen eye and supple wrist to catch a specimen in full flight, when standing on the face of a steep incline, or peering over the verge of a beetling cliff at night. In the net it rests much more quietly than *D. capsophila*. My reasons for considering the insect to belong to the genus *Dianthœcia* are quoted by Mr. Tutt in his 'British Noctuæ.' Buckler classed it with the Luperinæ, chiefly because *luteago* was relegated to that genus by Guenée, and because they were thought (erroneously, I believe) to be internal feeders. The Dianthœcian characters I rely on are shortly as follows:—1. Its feeding on species of *Silene* (root by preference, stems, foliage, and capsules when necessary). 2. The characters of the larvæ and date of emergence of the imago, being two months in advance of that of all the French Luperinas except *virens* and *dumetorum*, which fly July to August, as against May and June (*luteago*, Berce). 3. The characteristic protuberance at the tip of the wing-cases of the pupa, which I understand is not present in *luperina*. 4. The antennæ, which are slightly ciliated in both sexes, those of the males of *luperina* being much more deeply pectinated than those of *D. luteago*. 5. The hind wings of both sexes being clouded both in the type and more distinctly in the variety, a characteristic of *Dianthœcia* as opposed to that of *luperina*. 6. The presence of the characteristic pale spot near the anal angle of the hind wing, discernible in var. *barrettii*, though in our melanic var. of *D. cæsia* it is obsolete, but well marked in its continental type. 7. The tufted abdomen. All these are well-recognised Dianthœcian characters; but it still remains a question what should be the strict definition of *luperina*, given so indefinitely in such text-books as I have reference to, and continental authors differing so widely in the species included.

Dianthœcia cæsia, *Bork.*, var. manani, *Gregs.*—This species is to be found in all suitable spots on the rocky coast-line of the South of Ireland, from Hook Point to Dingle Bay, as well as the Isle of Man, which possesses a distinctly Irish fauna, and probably was once conterminous with or nearer to the now subsiding east coast of Ireland. The cliffs of Antrim, Derry, and Donegal still await investigation, little work having been done there either by myself or others. As with our form of *D. luteago*, the Irish form of *D. cæsia* is distinctly melanic, the greyish blue of the Swiss type being darkened to a dingy slate-grey. Some of our specimens exhibit a parallel mottling to that of Borkhausen's type, the ochreous central fascia being reproduced by a paler suffusion, occasionally showing some trace of yellow; the basal patch and a portion of the waved antemarginal band of the type being sometimes also suggested. In the S.W. extremity of Ireland, on the Blasket Islands and elsewhere, very dark blackish blue unicolorous forms occur. The first capture of this species in Ireland in 1867 closely followed Mr. Gregson's discovery of the insect in the Isle of Man, one larva being taken by Mr. Warren Wright at Tramore, from which he bred an imago, which was submitted to Mr. Birchall, and notified in his Supplemental Irish List of 1872. No other Irish records were added till 1883, when I had the pleasure of taking the imago at Tramore and eleven other southern stations, among which Minehead, Ballycottin, Roches Point, Old Head of Kinsale, Galley Head, cliffs near Glandore, Dursey Island, and the Blaskets are the most notable.

(To be continued.)

"THE KILLING AND PRESERVATION OF INSECTS."

By B. Stafford-Chope.

In the July number of this year's 'Entomologist' (*ante*, p. 205), a correspondent writes asking for information upon some very important points respecting the killing and preservation of insects. No replies to those queries have, to the best of my knowledge, been forthcoming up to the present; but I think this subject should not be allowed to drop without some attempt being made, through the medium of the 'Entomologist,' to answer the chief points upon which Mr. J. R. Cattle asks for information.

With regard to killing. There is, I think, no doubt but that the cyanide-bottle, kept in good condition and not allowed to retain damp, is the best mode of killing insects of all orders; but in the case of some of the larger moths, such for instance as the Sphingidæ, an injection of strong nicotine will be found more quickly effectual. A simple method for administration is to dip the point of a needle in the nicotine of a pipe, and make a puncture underneath the thorax of the insect, after the latter has been stupified by strong ammonia or chloroform fumes. The cyanide-bottle is quite harmless to the colours of all insects, with the exception of some "greens," such for example as the green of the "emeralds." To kill such insects, I consider bruised laurel shoots are better than the vapour of chloroform, which is apt to make the wings so rigid as to render the difficulty of setting properly very great. If it be desired to set an insect immediately after killing, oxalic acid will prove to be the best poison, as there seems to be little or no *rigor mortis* consequent upon the use of this acid.

As to preservation. The most important point about the preservation of insects primarily is, that they should be allowed to remain upon the setting-board until they are quite dry; and, in the second place, I think it is a great mistake not to periodically (say once a month) remove the glass-tops from the drawers of the cabinet to allow exposure of the specimens to the free atmosphere of a well-aired room, in which the cabinet should be kept. Never place specimens from other collections in the cabinet without previously dipping them in corrosive sublimate in alcohol, or some like preparation. Under these conditions moulds and mildew need not be feared. The cabinet should be constructed of mahogany in preference to oak, for oak is much more subject to gather and hold damp than mahogany. Corrosive sublimate in alcohol is the best thing to paint the bottom of the drawers of the cabinet with; and although it is absolutely fatal to insect life, it is doubtful as to how long it remains a preservative. If the drawers of the cabinet be kept well aired and the cells well filled with naphthaline, no mites need be feared. All insects (except perhaps those of a delicate green colour, which are usually affected by very little) imported from foreign collections, however, should be dipped, as described by Mr. Cattle, in corrosive sublimate in alcohol before being introduced into the cabinet.

As to grease. There is no doubt that grease is, as Dr. Guard Knaggs holds, a result of decomposition; and as far as my experience goes there is really no certain preventive. It is certainly advisable to stuff the bodies of all large moths before the contents become hard, as the Rev. Joseph Greene suggests in 'The Insect Hunter's Companion,' pp. 77, 78. As a cure for grease I would recommend slaked-lime, used in the manner described by Mr. J.

T. Fountain (*ante*, p. 303), which treatment, to my mind, is far the most quick and satisfactory. Benzole is also used in museums with some success.

The preparation of larvæ by the method of inflation is far from proving satisfactory, either in the retention of shape or colour. Of the process suggested by Mr. Cattle I have had no experience, but it strikes one as being feasible. Spirits of wine would, no doubt, be better than turpentine, which would affect some colourings in hairs; but the experiment will have to be tested before anything definite can be said upon the subject, although, doubtless, some professors may have already tried both methods, and will give us information upon the results.

Colyford, Devon, Nov. 4th, 1895.

NOTES ON ORTHOPTERA.

By C. W. Dale, F.E.S.

Forficula pubescens, Géné.—This earwig may be easily known from the common one by the wings being abortive. It occurs chiefly among reeds on the south coast, the localities being Bonchurch, Weymouth, Charmouth, Scilly Isles, and probably intervening places if searched for. It was first taken by my father on Sept. 28th, 1837. That it is not entirely confined to the coast may be seen from the fact that one was taken at Salisbury by Curtis, and a couple have been taken in my garden at Glanvilles Wootton.

Mecostethus grossus, Linné.—In an article on British Orthoptera (Entom. xxii. 197), Mr. Miller states that "it is said to occur in fields, but is probably not a native of this country." Mr. Briggs (Ent. Mo. Mag., Nov. 1895) states that "previous to the present year only three specimens seem to have been recorded from Great Britain during the present half-century." However, in the 'Young Naturalist,' vol. vii., and Ent. Mo. Mag. xxvi. 34, I recorded it as occurring on the Dorset Heaths. The last specimens I took were in the Isle of Purbeck, on July 27th, 1880; and I have no reason to doubt that it still occurs there. My father used to take it commonly at Whittlesea Mere, and also on Parley Heath, and in the New Forest. It is apparently a local species, being confined to the wettest and most boggy portions of heath-land; and has occurred in the west of Ireland, and in the counties of Dorsetshire, Hampshire, Huntingdonshire, Cambridgeshire, and Norfolk, and in former years in the marshes close to London. Some uncertainty has arisen owing to the name of *grossus* having been applied in former years to the common grasshopper, and that of *flavipes* to this species.

Œdipoda cærulescens, L.—Has been taken at Southampton, supposed to have been brought over in garden produce from the Channel Isles, where it is fairly common.

Pezotettix pedestris (Entom. xxii. 196) is only *Stenobothrus parallelus*, Zett.

Tettix bipunctatus, L.—May be found all the year round, as it hybernates amongst dead leaves.

Gomphocerus rufus, L.—This is rather a local species, and is recorded by Mr. Eland Shaw (Ent. Mo. Mag. xxv. 420) as occurring at Maidstone, Boxhill, and Reigate. To these localities I may add Battersea Fields, where it was taken early in the century by Samouelle; and the New Forest, where it was taken by my father on August 12th, 1827, and October 1st, 1830.

Decticus verrucivorus, L. — To Mr. Shaw's localities of Rochester, St. Margaret's Bay, and Christchurch (Ent. Mo. Mag. xxvi. 97) I may add the New Forest, where a fine male was taken by my father on July 3rd, 1844.

Platycleis grisea, Fab. — Seems to have a partiality for the rest-harrow (*Ononis arvensis*).

Nemobius sylvestris.—This cricket seems to be confined to the New Forest, as I have not heard of its occurrence elsewhere in England.

Glanvilles Wootton, Nov. 2nd, 1895.

NOTES AND OBSERVATIONS.

On Breeding Arctia caia for Varieties.—For some years past I have reared numbers of this moth, both first and second broods, in the hope, like Mr. George Stanley Morley (*ante*, p. 312), of obtaining "varieties." My departures from the type are two only, and are not worth mentioning when one sees Newman's figures, or the marvellous "tigers" in Mr. Capper's collection at Liverpool. They are both females, and are first-brood specimens. In each the spots and blotches are boldly developed, the basal row of spots on the lower wings forming a broad, black, transverse bar. Now for the upper wings. In No. 1 the chocolate blotches are not of a deep tint; the central one is three-lobed, the three lobes reaching the costal margin. The pale markings are pure white. No. 2. Chocolate blotches dark; central one three-lobed, the three lobes reaching the costal margin. The pale markings are ochreous. My experiments have always included rearing from the egg on specific plants, since varieties have been supposed to be the outcome, to some extent, of a somewhat unnatural diet. I have, for example, reared a second brood, *all types*, on walnut leaves. As I write (Nov. 6th) I have imagines emerging (on a shelf a yard from the kitchen fire) fed up exclusively on elder, but all terribly typical. I see Mr. Morley's first emergence in this brood took place twelve days after spinning up, four days earlier than mine. Many of my larvæ are only in their third stage, and are now evidently hybernating, in spite of their warm quarters. One by one I examined each member of the first broods, and set it at liberty if typical. The second broods are not so satisfactorily dealt with. They must be killed. To turn them out would be to meet a lingering death. My experience shows that the plant theory of producing varieties is an exploded myth, and I intend trying it no more. To those who wish for striking forms I would say—breed, either from exceptionally light- or exceptionally dark-coloured parents. The only difficulty is to get the selections; and even after the difficulty has been overcome, you are open to discomfiture, any day, by someone showing you a most marvellous form of the insect—captured, and sold for a mere song, by some novice. Experience shows that certain species, including *A. caia*, vary much more in some localities than in others. The variety *olivacea*, for instance, of *Polia chi*, we do not take in Cheshire, but they do in the county of Durham. And if varietal forms of *Nemeophila plantaginis* are wanted, I should recommend Winchester rather than Doncaster or Witherslack. I have never been able to breed from the forced second brood of *A. caia;* and I am obliged to conclude that a second brood is not produced in this country naturally.—J. ARKLE; 2, George Street, Chester.

A CONVENIENT AMMONIA-BOTTLE FOR FIELD USE.—I have found an ammonia-bottle made in the following way of great use:—Take a wide-mouthed bottle, such as is used for cyanide, cut three or four bits of lint to fit the inside, and put them in the bottom; next get a tapering bit of wood,—a pen-holder does very well,—oil or grease the last inch of it, and put it resting upright on the lint in the bottom of the bottle, steadying it with two bits of cork in the mouth of the bottle, pour in enough plaster of Paris mixed with water to cover the lint an inch deep; when dry remove the pen-holder, the removal being facilitated by the grease previously applied; this leaves a hole in the plaster of Paris leading down to the lint. When required for use, with a pipette (I employ the instrument used for filling stylographic pens) introduce a few drops of strong liquid ammonia (liquor ammoniæ fortior) through the hole in the plaster of Paris so that it soaks into the lint underneath; when the hole is plugged with a bit of cotton-wool or the plaster covered with a bit of lint, the bottle is complete and ready for action. If used often the ammonia will have to be renewed frequently; about twelve drops are sufficient for an afternoon's work; a single drop of chloroform in the bottle every half-hour or so when in use increases the efficiency, and curtails the period of the death-struggle; in fact, small Geometers drop dead almost instantly. When lint and plaster become saturated, all that is required is to put the bottle (with the cork out) in an oven till all is dry again. For day work, especially among Geometers, it is very useful, and also for net work at night. The insects are in a beautiful state of relaxation, and fit to be set at once; they should be taken out of the bottle as soon as dead, as, if left in many hours, the colour of a good many suffers. For sugar, of course, it is useless, a single application of the bottle causing a general stampede. N.B.—Care must be taken not to breathe the fumes given off by the ammonia, as the effects of a deep inhalation would be, to say the least, unpleasant. —N. F. SEARANCKE; Mitcheldean, Nov. 10th, 1895.

[Our correspondent very kindly sent us one of these bottles already charged with ammonia. Although it came to hand on the morning of the 12th, no opportunity of testing it occurred until the 15th, when it was found to almost instantly kill some specimens of *Hybernia* that were placed in it.—Ed.]

CAPTURES AND FIELD REPORTS.

Larvæ of Sphinx convolvuli from Cornwall.—I had the pleasure of receiving yesterday, from the same source as the previous four reported, *ante*, p. 311, thirteen more larvæ of *S. convolvuli*, two of which, I am sorry to say, succumbed to the journey or cold. In size they range from full-fed, or nearly, about four inches long, to one of little more than an inch. Another of the original four went to earth last Wednesday, and, with the exception of one or two, all the rest are feeding freely in a warm room.—W. T. Sturt; West House, Queen's Road, Kingston Hill, October 27th, 1895.

Sphinx convolvuli in Surrey.—Two examples of *S. convolvuli* were brought to me in the early part of September.—(Rev.) J. E. Tarbat; Weybridge, Nov. 4th, 1895.

Sphinx convolvuli in Gloucestershire.—Several specimens were seen and one taken in this village during the last week of September.—R. W. Fitzgerald; Court House, Uley, Dursley, Gloucestershire.

Sphinx convolvuli in South Wales.—A male specimen of *S. convolvuli* was brought to me when at Langharne, Carmarthenshire, in September.—T. B. Jefferys; Bath, Nov. 5th, 1895.

Sphinx convolvuli in Lincolnshire.—An example of *S. convolvuli* was brought to me on Sept. 18th, but it was in very poor condition.—W. Lewington; King Street, Market Rasen.

Catocala fraxini in N. Devon.—I have great pleasure in announcing the capture of *Catocala fraxini* on Sept. 9th. It is a freshly emerged male, and measures nearly four inches across the wings. It was captured by my friend E. M. Eustace, of Westward Ho, in his garden, and is now in my possession.—O. F. E. Cooke; Southmoor, Westward Ho, North Devon, Nov. 12th, 1895.

Accidental Aberration of Euchelia jacobææ?—On June 10th last, I bred a female example of this species, in which the crimson of all the wings was replaced by a brick-red; left hind-wing dwarfed. It seems to be an accidental aberration.—Frank Bromilow; Bournemouth.

Acherontia atropos in Lincolnshire.—I had six full-fed larvæ of *A. atropos* brought to me in September, and I have heard of nine others being taken in this neighbourhood.—W. Lewington; King Street, Market Rasen.

Hesperia comma, &c., in Lancashire.—Mr. Moss, of Windermere, captured a specimen of *H. comma* on the Lancashire side of the lake, close to the Ferry Hotel. He has also bred a good many specimens of *Sesia sphegiformis* at Windermere, not far from the railway station. Sugaring seems to have been a great success, judging from the results obtained by Lancashire collectors. Among other insects taken was a curious specimen which my good friend G. Lotxam captured and brought to me. I fancy it must be a variety of *Xylophasia sublustris*, but no typical specimens of this species have been taken. My son found a specimen of *Epunda lutulenta* in his tobacco pouch, where it must have crept while he was lying on the grass.—J. B. HODGKINSON; Nov. 15th, 1895.

PIERIS DAPLIDICE IN KENT.—I took four examples of *P. daplidice* at Deal, in August this year, under the cliff towards Dover, one on one day and three on another, all ragged examples.—C. SWINHOE; Avenue House, Oxford, Nov. 14th, 1895.

COLIAS EDUSA IN 1895: ADDITIONAL RECORDS.—

Devonshire.—During a three-weeks' stay in South Devon in the month of October, I found *C. edusa* fairly abundant, though only one specimen of the var. *helice* was noticed. Those specimens of the type captured as late as Oct. 25th were in excellent condition, which points to a third brood. On the same day I saw also examples of *Vanessa cardui* and *Chrysophanus phlœas*, in addition to the usual *V. atalanta*.—(Rev.) J. E. TARBAT; Weybridge, Nov. 4th, 1895.

Hampshire.—On Aug. 15th, on the Golf-links at Bournemouth, I caught three males, and saw one or perhaps two others. On Aug. 17th, near Holmslea in the New Forest, I took one female.—W. J. LUCAS; 25, Knight's Park, Kingston-on-Thames, Nov. 12th, 1895.

Kent.—A friend took two female *C. edusa* on Aug. 8th (one var. *helice*); these were disturbed from grass, as the day was very windy, and insects were not on the wing; the *helice* he first took for a "white;" but luckily followed and captured it, when he was agreeably surprised; on the 16th another typical female, 22nd another *helice*, 28th one male, and Sept. 3rd a male and female. It will be seen that of the seven specimens caught only two were males, which is rather unusual. Several others were seen. I saw one on Aug. 18th, and on Sept. 21st took two, besides seeing four or five others in the trenches round the Castle here, but these were poor specimens, being much worn. The last I saw was on Oct. 14th, flying swiftly along a bank by the Castle. This day I took a fine *M. stellatarum* at rest on a wall.—H. DOUGLAS STOCKWELL; 2, Albert Road, Dover, Nov. 16th.

Suffolk.—I saw one specimen of *C. edusa* on Sunday morning, Aug. 18th. Also one was seen near Glemsford station, about a mile from Cavendish.—(Miss) M. WILSON; Cavendish Rectory, Suffolk, R.S.O., Nov. 5th, 1895.

Surrey. — During August and September G. B. Cooper and other young friends of mine took about a dozen male specimens near Claygate and Guildford.—W. J. LUCAS.

Sussex.—While staying at Eastbourne in October I took a fine male, also an example of var. *helice.* They were feeble and easy to take.—H. M. EDLESTEN.

LATE SPECIMENS OF COLIAS EDUSA IN BRITAIN.—At the last October meeting of the South London Entomological and Natural History Society Mr. Carrington and Mr. Frohawk reported fresh specimens of *C. edusa* on the south coast, Oct. 20th. In a recent note concerning the species in West Sussex, Mr. W. M. Christy states: "Specimens were taken here up to Oct. 17th; and again one example was captured on Oct. 28th. A friend took one at Chichester on Oct. 30th. All were absolutely fresh." The Rev. J. E. Tarbat (*supra*) records three specimens Oct. 25th. In the 'West Sussex Gazette' (kindly communicated by Mr. Christy), the Rev. Dr. Arnold records a specimen taken by Miss Hipkins, at Bacton, on Nov. 1st. Mr. Carrington informs me that he saw a lovely specimen flying briskly on Nov. 9th near Shoreham in Sussex; and Mr. McArthur reports the species "in some numbers during the present month (November) between Rottingdean and Shoreham, last date the 13th." Turning to late records in previous years, we find that in 1877 (an *edusa* year) specimens were captured in November up to the 4th at Folkestone, on which date a very fresh specimen and also a pair *in cop.* were taken, and to the 17th at Hastings. On Oct. 28th, 1883, a male specimen was captured in a meadow between Cookham and Maidenhead. Although the species had been observed in September that year in many parts of England from Devonshire to Nottinghamshire, it was not really common in any of the localities reported. In 1884 *C. edusa* was recorded as very abundant at Lulworth, Dorsetshire, during the second and third weeks of October; it had been taken in various parts of the country during August and September, but does not appear to have been observed earlier in the year. In 1892 *C. edusa* and *C. hyale* were more or less abundant throughout England, and the former species was seen as late as Nov. 3rd at Littlehampton and Nov. 10th at Sidmouth. The following year *C. edusa* was again with us in some numbers, and was seen as early as March 29th at Seaton, in Devonshire, and early in April at several places. The latest specimens recorded that year were Oct. 12th (abundant at Sidmouth) and Nov. 2nd (several at Seaton). At the last-named locality specimens were seen each month, except August, from March to November.—Richard South.

Second Brood of Nemeobius lucina.—On June 3rd Mr. Helps, of Forest Hill, and myself, collected some seven dozen ova of *N. lucina*, which we fed up on primrose, cowslip, and the garden polyanthus. They all pupated during the third week in July. On Oct. 20th and Nov. 3rd Mr. Helps bred two imagines, and one of mine emerged on Nov. 7th; all were females. The pupæ were in both cases kept out of doors.—Walter A. Pearce; West Dulwich, S.E.

Larvæ in Surrey and Kent. — Larvæ of *Vanessa polychloros* and *Diloba cæruleocephala* were common here in June. During August and the early part of September I took the following larvæ near Ashford, in Kent:—*Acronycta leporina* (on sallow), *Demas coryli*, *Chærocampa porcellus*, *Gnophria rubricollis*, *Dasychira pudibunda*, *Drepana lacertinaria*, *D. cultraria* (*unguicula*), *Pterostoma palpina*, *Notodonta dictæoides*, *N. dromedarius*, *N. ziczac*, *Cossus ligniperda*, and *Euclidia mi*.—E. A. Brackenbury; Cranleigh School, Surrey.

Sugaring in the Cotswolds, 1895.—From June 4th to Oct. 14th I sugared some fifty times with rather poor results, considering that this locality is supposed to be particularly rich in Lepidoptera. Common insects occurred very plentifully, *Triphæna pronuba*, in particular, was seen by the hundred on some nights, from ten to forty on each tree, almost to the exclusion of everything else, and in endless variety, from pale ochreous to nearly black, mottled, &c. Subjoined is a list of species taken:—*Thyatira derasa*, *T. batis* (one fresh example taken Aug. 21st), *Acronycta megacephala*, *A. ligustri* (scarce), *A. rumicis*, *Leucania lithargyria*, *L. comma*, *L. pallens*, *Xylophasia lithoxylea*, *X. monoglypha* (swarms), *X. hepatica* (common), *Cerigo matura* (rare), *Mamestra brassicæ*, *Apamea didyma* (very common and varied), *Miana strigilis* (common), *Grammesia trigrammica* (common, beginning of June), *Rusina tenebrosa*, *Agrotis segetum*, *A. exclamationis*, *Noctua plecta*, *N. c-nigrum*, *N. festiva*, *N. rubi*, *N. xanthographa* (very common, but only seen for a week or so), *Triphæna fimbria* (rare), *T. comes* (common), *T. pronuba* (hundreds), *Amphipyra pyramidea* (common), *A. tragopogonis* (swarms), *Mania typica*, *Orthosia macilenta*, *Anchocelis rufina*, *A. pistacina* (common and varied), *A. litura* (common), *C. vaccinii*, *Scopelosoma satellitia* (very common in October), *Xanthia fulvago*, *X. aurago* (common on Oct. 1st), *X. circellaris* (in great numbers), *Calymnia trapezina*, *C. affinis* (rare), *Miselia oxyacanthæ*, *Agriopis aprilina*, *Euplexia lucipara*, *Phlogophora meticulosa* (common), *Aplecta prasina* (rare), *A. nebulosa*, *Hadena protea*, *Calocampa exoleta* (rare), *Xylina ornithopus* (very common in October), *Boarmia repandata*, *Iodis lactearia*, and *Camptogramma bilineata*. Most of my sugaring was done on the edge of an oakwood which lies at a considerable height above this village. I used methylated spirit instead of rum to mix with the treacle, and found it answer admirably, insects being much less skittish than when rum is used.—R. W. Fitzgerald; Uley, Dursley, Nov. 2nd, 1895.

Notes on Crambites, 1895.—*Crambus falsellus* bred from pupa found in a silken cocoon among *Tortula intermedia*, at Sandy, Beds, the beginning of June; imagos at Skegness, July. *C. pratellus* common at Sandy and Ely, June and July. *C. hortuellus*, Skegness and Southend in July; larva in moss at Waterhead, Cambs, in May. *C. culmellus*, Southend, July. *C. latistrius*, Skegness, August. *C. perlellus*, Southend, July. *C. selasellus*, Stuntney Fen, Ely, and one at Skegness, July. *C. tristellus*, common at Ely end of July; also Skegness, plentiful in East Fen, Lincolnshire, August. *Chilo phragmitellus*, Ely. *Schœnobius mucronellus*. Ely, July. *S. forficellus*, by side of ponds near Skegness, July. *Homœosoma binævella*, Southend (one), July. *Pempelia palumbella*, Skegness, August.—Albert H. Waters; Devonshire Road, Cambridge.

Notes from Shropshire.—My son caught a specimen of *Vanessa c-album*, which he brought to me, in a garden here, on Sept. 23rd. He saw two or three others, but was unable to capture them. On Friday, Sept. 27th, I took another in the same garden, but saw no others. The next day, Sept. 28th, I spent the whole morning searching in various gardens for this butterfly, but in vain. There were lots of plums lying about, but not a single specimen of *V. atalanta* or *V. c-album* could I see, although the former species had been very abundant a few days previously. Three *V. urticæ* were the only Vanessæ I saw. The day was very hot and sunny, and *Pieris rapæ* was very numerous. I imagine the Vanessæ had gone into hybernation; possibly this early move was due to the abundance of fruit enabling them to lay in sufficient stores more rapidly than usual.—F. C. Woodforde; Market Drayton, Salop, October 20th, 1895.

Notes on the Season.—I have not had as many opportunities as usual during the past season of getting out after Lepidoptera, but on each occasion that I did so I was struck by the absence of even some of the usually common Diurni. I paid several visits to Abbott's Wood, Polegate, but there was hardly anything to be seen except a few *Epinephele ianira* and *Lycæna alexis*. *Melitæa athalia* was very scarce, and so was *Thecla* *rubi*. *Ino statices* was plentiful at the beginning of June, and a month later *Colias edusa* and *Gonopteryx rhamni* were now and again to be seen. About the middle of August I took a fresh example of *Argynnis selene* in the White Fields. In other parts of Sussex I have noticed the same dearth of butterflies, and have failed to meet with many familiar species. I have not seen a single *Vanessa io* the whole summer, and it was only last week that I noticed two magnificent specimens of *V. cardui* near Lancing, evidently freshly emerged. *V. atalanta* has been plentiful, and *Lycæna corydon* and *L. bellargus* (*adonis*) were to be found in August, in their special localities. The early spring butterflies were very scarce, and I noticed *Euchloë* (*A.*) *cardamines* in one locality only, while *Argynnis euphrosyne* was decidedly few and far between. The larvæ of *Cossus ligniperda* have been obtained in large numbers in Brighton, both this season and last, chiefly from poplars, and at certain spots on the downs those of *Bombyx rubi* have appeared in enormous quantities. A few larvæ and pupæ of *Acherontia atropos* were obtained by my young friend, Miss Lilian Cardinall, in September, from potato fields here and at Portslade, who also, early in August, took two fine *Sphinx convolvuli* in the neighbourhood of St. Catherine's Point, Isle of Wight, and specimens of *Melanargia galatea, Limenitis sibylla, Vanessa polychloros, Colias edusa* and var. *helice*, at Parkhurst Forest, as well as *Argynnis paphia, A. adippe*, and other commoner species.—W. H. Blaber; 34, Cromwell Road, Hove, Sussex, Oct. 21st.

Collecting in the South.—Bournemouth, besides being a most enjoyable watering-place, is perhaps even more attractive for lovers of natural history, it being almost the metropolis, as it were, of all branches of that interesting pursuit. The six weeks that I spent there in April and May proved the best weather possible for collecting purposes. The large expanses of heath, many of which, however, sad to say, are being completely spoilt by continuous building, gave ample work for the net. Upon them all *Anarta myrtilli* darts like lightning, occasionally settling on the heather for a moment: it is in this moment that you must make your swoop or drop the net over it; the latter method is not very advisable, as the insect nearly always feigns death and drops into the heather, whence it will not rise for from five to fifteen minutes: a fine exercise of patience! *Cœnonympha pamphilus, Thecla rubi, Lycæna ægon, L. agestis, L. alexis, Dicranura vinula* (larvæ), *Notodonta ziczac* (larvæ), *Lithosia mesomella, Spilosoma mendica, S. fuliginosa, Nemeophila russula, Arctia villica, Bombyx rubi, Saturnia pavonia* (and larvæ on sallow), *Boarmia cinctaria, Nemoria viridata, Eupithecia nanata* (and larvæ), *Panagra petraria, Scodiona belgiaria, Ematurga atomaria, Bupalus piniaria, Pachcynemia hippocastanaria, Aspilates ochrearia, Thera variata, Coremia ferrugata, Melanthia ocellata, Eubolia plumbaria, Agrotis strigula* (sugar), *Rusina tenebrosa* (sugar), *Euplexia lucipara* (sugar), *Hadena oleracea* and *H. contigua* (sugar), were amongst those taken on the heaths in various ways. Light did not produce anything very grand, the chief captures being *Pachnobia rubricosa* (in May!), *Cucullia umbratica, Lophopteryx camelina, Odontopera bidentata, Eupithecia vulgata*, and *Pachcynemia hippocastanaria*. Sugar, too, was disappointing, the few things that were taken being mentioned above. Several most interesting expeditions were made to the New Forest, with Brockenhurst as the centre on every occasion. Rhinefields and Stubby Copse were the two most favourite directions. The famous rhododendrons at the first-mentioned place, though not fully out, were already attractive to

Macroglossa fuciformis, of which we managed to net a fair number in the best possible condition, one solitary *M. bombyliformis* finding its way to the flowers and the net. At Stubby the latter insect was in some abundance, two specimens *in cop.* being taken on the wing by a friend. Insects seemed rather scarce, especially Geometers. *Pieris brassicæ*, *Gonopteryx rhamni* (in plenty), *Colias edusa* (three seen), *Argynnis euphrosyne*, *A. selene*, *Nemeobius lucina*, *Zygæna loniceræ*, *Lithosia aureola*, *Euchelia jacobææ*, *Nemeophila russula* (female), *Spilosoma mendica*, *Tephrosia biundularia*, *T. punctularia*, *Venilia macularia*, *Ellopia prosapiaria*, *Nemoria viridata*, *Iodis lactearia*, *Zonosoma porata*, *Cabera pusaria*, *Bupalus piniaria*, *Thera variata*, *Lomaspilis marginata*, *Melanippe rivata*, *Larentia olivata*, *Anticlea rubidata*, and *Cidaria suffumata* complete the list of those taken at the two former places. An unproductive trudge to Hohensleigh, in the hope of taking *Gnophria rubricollis*, wearied and disappointed us, though a couple of *Boarmia roboraria* just saved the day from being an utter blank.—C. T. Nash; Standish Vicarage, Stonehouse, Gloucester.

Collecting in 1895.—As this season has been, so far as we have been concerned, an unusually good one, a list of the chief captures may perhaps be of some interest. A visit to Darenth Wood at Easter furnished us with *Brephos parthenias*, and at sallow *Tæniocampa munda* and other common moths. In April *Selenia illunaria* was common at Willesden. May provided no fresh species in the above neighbourhood, but a visit to Lyndhurst at Whitsun for four days proved very successful, our finds being as follows:—*Lycæna argiolus* (one battered female), *Scodonia belgiaria*, *Aspilates strigillaria*, *Venilia maculata*, *Bupalus piniaria*, *Larentia pectinitaria*, *Anaitis plagiata*: all the foregoing were netted. At sugar we obtained *Thyatira batis*, *Xylophasia rurea*, *Grammesia trilinea*, *Agrotis exclamationis*. A sheet hung up in the woods attracted only *Spilosoma menthastri* and *Odontopera bidentata*. The following larvæ were beaten:—*Tæniocampa munda*, *T. miniosa*, &c., *Agriopis aprilina*, *Amphipyra pyramidea*, *Cymatophora flavicornis*, *Asphalia ridens*, *Brephos parthenias*, *Geometra papilionaria*, *Nyssia hispidaria*, *Himera pennaria*, *Phigalia pilosaria*, and others. During June and July sugar at Willesden attracted *Rusina tenebrosa*, *H. marginatus*, and *Noctua triangulum*. In August *Bryophila perla*, and *Agrotis aquilina* were taken at Banbury, the latter at light. At Turnstead, in Essex, sugar on the night of the great thunderstorm in August produced *A. pyramidea*, *N. c-nigrum*, and *T. orbona*. In the same parish we found several larvæ of *Dicranura furcula*, a fine *Vanessa polychloros*, and, at light, *A. plagiata*. At Willesden, during August, *Catocala nupta* and *Mania maura* turned up at sugar, also on the night of a thunderstorm. At Willesden, in September, *N. c-nigrum* and *Miselia oxyacanthæ* came to sugar, and we took the following species on gas-lamps between Kingsbury and Neasden (adjoining Willesden):—*Gortyna flavago*, *Xanthia silago* and *X. cerago*, *Anchocelis pistacina* and *A. lunosa*, *Eugonia tiliaria* and *E. fuscantaria*, *Himera pennaria*, and *Cidaria miata*. In October, so far, we have taken at light, at Neasden, *Diloba cæruleocephala*, *Oporabia dilutata*, and *Hybernia defoliaria*; also *Phlogophora meticulosa*, *Anchocelis pistacina*, and *Cerastis spadicea*. A fine larva of *Bombyx rubi* was found in a field near Edgeware. Altogether, being the possessors of only a small collection, we have reason to be well satisfied with the results of this season's work.—A. R. and R. H. Heath; Willesden, Middlesex.

SOCIETIES.

Entomological Society of London.—*Oct. 2nd*, 1895.—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. George H. Carpenter, B. Sc., of the Science and Art Museum, Dublin; and Herr Paul Krantz, of Pretoria, Transvaal, South Africa, were elected Fellows of the Society. Mr. McLachlan exhibited, on behalf of Mr. Bradley, of Birmingham, the specimens of Diptera attacked by an entomophthorous fungus of the genus *Empusa*, of which an account had recently appeared in the 'Entomologist's Monthly Magazine' for August, 1895, p. 178. Mr. H. Tunaley exhibited specimens of *Lobophora viretata* from the neighbourhood of Birmingham. Specimens of the green dark form were shown in their natural positions on the bark, and specimens of the yellow form were shown on leaves on which they rested. Mr. J. W. Tutt exhibited, for Mr. Anderson, of Chichester, cases formed by a lepidopterous insect received from the Argentine Republic, which he said he recognised as being either identical with, or closely allied to, *Thyridopteryx ephemeræformis*, which did great damage to many orchard and forest trees in North America. Mr. Tutt also exhibited a series of *Lycæna ægon* captured by Mr. Massey, of Didsbury, on the mosses in Westmorland. The males were remarkable in bearing two very distinct shades of colour. The females also differed considerably from the form occurring in the South of England. He also exhibited a long series of *Hydræcia lucens*, captured on the mosses near Warrington, and for comparison a series of *H. paludis*; and he read notes on the various specimens exhibited. Dr. Fritz Müller communicated a paper entitled "Contributions towards the history of a new form of larvæ of Psychodidæ (Diptera) from Brazil." Baron Osten Sacken communicated a paper, supplemental to the preceding one, entitled "Remarks on the homologies and differences between the first stages of *Pericoma* and those of the new Brazilian species." The Rev. A. E. Eaton also contributed some supplementary notes to Dr. Fritz Müller's paper on Psychodidæ. Lord Walsingham read a paper entitled "New Species of North American Tortricidæ." In this paper twenty-nine species were dealt with, of which twenty-six were described as new, from Florida, California, N. Carolina, Arizona, and Colorado. The paper also included certain corrections made by the author in the nomenclature of genera.—David Sharp, *Acting Secretary*.

Oct. 16th.—Professor Raphael Meldola, F.R.S., President, in the chair. Sir Gilbert T. Carter, K.C.M.G., of Government House, Lagos, West Africa; and Mr. Sydney Wacher, F.R.C.S., of Dane John, Canterbury, were elected Fellows of the Society. The President announced the deaths of Prof. C. C. Babington, the last but one of the original members of the Society, and Prof. C. V. Riley, one of the ten Honorary Fellows of the Society, and commented upon their scientific work. Mr. W. F. H. Blandford spoke at some length on the valuable services rendered by the late Prof. Riley to the cause of Economic Entomology, and referred to the enormous number of papers and memoirs on the subject which he had contributed. Lord Walsingham also spoke as to the importance of the late Prof. Riley's work, and the respect and regard which he had for his estimable personal qualities.

Mr. F. C. Adams exhibited a series of nineteen *Merodon equestris*, containing several varieties, showing their resemblance to wild bees of the family Apidæ, and made a few remarks on mimicry. He also exhibited specimens of *Leptomorphus walkeri*, Curt., taken in the New Forest in September last, and *Melanostoma hyalinatum*, Fln. (male and female), from a series of eighteen also taken in the New Forest in the latter part of August last. Mr. Adams further exhibited a specimen of *Spilomyia speciosa*, Rossi, from the New Forest. Mr. Verrall, Dr. Sharp, and Colonel Yerbury made some remarks on these species and their distribution. Mr. Enock exhibited, and made remarks on, specimens of the mature male and female, and the nest of *Atypus piceus*, the British trap-door spider; also male and female specimens of *Andrena atriceps* and males of *A. fulva*. Mr. Tutt exhibited a long series of 143 males and 25 females of *Erebia nerine*, captured in the Tyrol, partly in the Mendel Pass and partly in the Val d'Ampezza, and read notes on the species, in which he criticised the description of it, and the published observations as to its habits, by Dr. Lang, Mr. Elwes, and others. Mr. Elwes made some remarks in reply. Lord Walsingham exhibited the types and paratypes of *Pseudodoxia limulus* (Rghfr.), together with the larval cases and a preserved larva. His lordship directed attention to the curious truncate concave head of the larva, which forms an operculum to the tube, and remarked that the cases of this insect, which were apparently not uncommon in Ceylon, the larva feeding on mosses and lichens, had been known for some considerable time. So long ago as 1864 Mr. McLachlan found them in the British Museum collection of cases of caddis-worms, and at that time, being only acquainted with the case, he was disposed to consider them the work of one of the Leptoceridæ. In 1889 Herr Rogenhofer gave the name *Fumea? limulus* to the case and its contents, and Mr. McLachlan agreed from the evidence then adduced that the insect was lepidopterous rather than trichopterous. Mr. C. J. Gahan exhibited, for Mr. Turner, an imago and some larval forms of *Ledra aurita*, Linn. Mr. G. C. Griffiths exhibited, and read notes on, hybrids between *Platysamia cecropia* (male) and *P. gloveri* (female), and between *P. cecropia* (male) and *P. ceanotha* (female); also between *Actias luna* (male) and *A. selene* (female). He stated that these hybrids were bred by Miss Emily L. Morton, of New Windsor, New York, in 1891, 1892, and 1893. Lord Walsingham stated that at the last meeting of the Society some discussion ensued, after the reading of his paper, in consequence of his having stated that *Grapholitha*, W., was preoccupied by *Grapholitha*, Hb. (Verz. Schm.); and he read a supplementary note on the subject explaining the references in his paper. Dr. A. G. Butler communicated a paper entitled "Notes on Seasonal Dimorphism in certain African Butterflies."—H. Goss, *Hon. Secretary.*

November 6th, 1895.—The Right Honourable Lord Walsingham, LL.D., F.R.S., Vice-President, in the chair. Mr. Cecil W. Barker, of Malvern, Natal, South Africa; and Lieutenant H. G. R. Beavan, R.N., of the Royal Naval College, Greenwich, S.E., were elected Fellows of the Society. Lord Walsingham announced the death of Mons. E. L. Ragonot, President of the Entomological Society of France, and, since 1887, a Foreign Fellow of the Entomological Society of London.

He remarked that Mons. Ragonot was especially distinguished by his knowledge of the Phycidæ (a Monograph on which group he had brought out in Russia), for his amiable personal qualities, and the readiness he showed to assist other workers in the identification of species. In conclusion, Lord Walsingham said that the loss of Mons. Ragonot would be greatly felt not only by the Entomological Society of France, but by entomologists all over the world, and that the Council had that evening passed a resolution to the effect that the Secretary should write a letter of condolence to the French Entomological Society on the death of their distinguished President. Colonel Swinhoe also spoke as to the great loss sustained by the death of Mons. Ragonot, and of the kindness and generosity of the deceased which he had personally experienced. The Secretary read a letter from Mr. Waterhouse, calling attention to the prospectus of a Monograph by Mr. Ernest Green on the Coccidæ of Ceylon. A copy of the prospectus and specimen plates were shown, and Lord Walsingham and Mr. McLachlan commented on the importance of the proposed work and the beauty of the plates. Mr. Ernest Green, who was present, made some remarks in acknowledgment. Mr. Stevens exhibited two larvæ, supposed to be those of a species of *Anobium*, which had been damaging oil paintings in his possession; also two specimens of a luminous species of *Pyrophorus*, which he had received alive from the West Indies. Mr. Adkin exhibited a portion of a collection of Lepidoptera made in Hoy, Orkney, in 1895, including the following species, viz., *Agrotis vestigialis*, *A. tritici*, and *A. cursoria*, not previously recorded from Orkney; *Nemeophila plantaginis*, having the usual yellow ground-colour of the hind wings replaced by red in many of the females; *Hepialus humuli*, males of the ordinary white form, bearing no resemblance to the Unst (Shetland) form, var. *hethlandica; Triphæna comes*, all very dark, all the fore wings almost black, the yellow of the hind wings of many of the specimens much obscured by blackish scales; *Noctua festiva*, showing forms of variation ranging between the pale southern and the dark *conflua* forms; *Epunda lutulenta*, some almost uniformly black, others pale grey with dark markings; *Tæniocampa gothica*, including var. *gothicina; Hadena adusta*, one almost black, others much variegated; *Thera juniperata*, many having the central fascia and apical streak very dark brown; and *Hypsipetes sordidata*, varying from blackish-brown to pale green. Mr. Barrett, Mr. McLachlan, and the Chairman made some remarks on the collection. Mr. Tutt exhibited a series of *Emydia cribrum* var. *candida*, which he had bred from eggs obtained from a specimen caught by Mr. Merrifield in May, 1895, in Northern Italy. He stated that being unable to obtain *Calluna vulgaris*, the ordinary food-plant, he had tried the larvæ with knot-grass (*Polygonum aviculare*), and had no difficulty in rearing them. The Rev. Canon Fowler exhibited, on behalf of Professor Poulton, living specimens of *Diapheromera femorata* bred from eggs received from Professor E. B. Titchener, of Cornell University, New York. He stated that the young larvæ had emerged from the eggs in July and August last and fed on lime. Several pairs had arrived at maturity, and were feeding in cases in the Oxford Museum. The Rev. J. H. Hocking exhibited a specimen of *Xylina zinckenii* (*lambda*), taken by him at sugar on the trunk of an oak tree at Copdock, near Ipswich, on Sept. 30th last. It was in beautiful condition, and had apparently only recently emerged from the chrysalis. He also exhibited two specimens of *Xanthia ocellaris* taken at the same time. Mr. Barrett referred to the few recorded captures of *X. zinckenii* in this country. Mr. R. W. Lloyd exhibited male and female specimens of *Amara alpina* from Garvell, Perthshire. Colonel Swinhoe stated that he had, during the past summer, captured four specimens of *Pieris daplidice* at Deal. He said they were worn, and had probably been blown over from France. Mr. Tutt remarked that he had collected at Deal for many years, but had never met with *Pieris daplidice.* Mr. Tutt read a paper, communicated by Professor A. Radcliffe Grote, entitled "Notes on the genus *Cidaria.*" Dr. T. A. Chapman read a paper entitled "Notes on Pupæ; *Orneodes*, *Epermenia*, *Chrysocorys*, and *Pterophorus.*" Lord Walsingham, Mr. Blandford, and Mr. Tutt took part in the discussion which ensued.—H. Goss and W. W. Fowler, *Hon. Secs.*

South London Entomological and Natural History Society.—*Sept. 26th*, 1895.—T. W. Hall, Esq., F.E.S., President, in the chair. The President referred to the great loss the Society had sustained by the death of Mr. W. H. Tugwell, and Mr. Adkin proposed, and Mr. Tutt seconded, that a letter of condolence and sympathy be sent to Mrs. Tugwell. Mr. Adkin exhibited specimens of *Spilosoma menthastri*, Esp., from Morayshire, of which the fore wings were a rich dark brown in colour; and a specimen of *Carpocapsa pomonella*, L., bred from a walnut. Mr. West, of Greenwich, stated that he had also bred the species from chestnut. Mr. South, a short series of *Xanthia fulvago*, L., from Macclesfield, representative of a large number bred this year; v. *flavescens* occurred in the proportion of about 1 in 20. One specimen somewhat resembled *X. flavago* in colour, but this form was very rare. Mr. Oldham, a series of *Lycæna bellargus*, Rott., from Folkestone, showing considerable blue coloration in the females. Mr. Tutt, on behalf of Mr. Massey, a long series of *Lycæna ægon*, Schiff., from Westmorland, the males showing both tinted forms, and the females most beautifully suffused with blue; long series of both the *lucens* and *paludis* forms of *Hydræcia nictitans*, Bork., from Warrington, but stated that the two forms were not taken together; long series of *Orthosia suspecta*, Hb., from Warrington, showing nearly all forms but the type; and a short series of *Celæna haworthii*, Curt., showing exceedingly well-marked dimorphism. Mr. Turner, specimens of *Calopteryx virgo*, L., from Horsham; two specimens of *Chærocampa celerio*, L., from an old collection made near Sheffield many years ago; and a specimen of *Lycæna icarus*, Rott., from Clandon, having the submarginal row of spots on the under sides of the fore wings prolonged into dashes. Mr. Carrington, the flowers of the Canadian wallflower, which had been grown in Mr. Briggs's garden from seeds picked at the head of Lake Superior. It was resolved to instruct the Council to invite each member to forward his photograph for insertion in the Society's album.

Oct. 10th.—President in the chair. Mr. Hy. Tunaley, F.E.S., 30, Fairmount Road, Brixton Hill, S.W., was elected a member. Mr. McArthur exhibited specimens he had taken this year in the Orkneys, *viz.*, a series of *Thera juniperata*, L., with the ground colour much whiter, while the dark markings were intensified and somewhat extended; two almost white specimens of *Melanippe montanata*, Bork.; three fine varieties of *Nemeophila plantaginis*, L., one having much darker hind wings, while another had yellowish-red hind wings with fewer dark markings; and var. *sedi*, Gn., and var. *luneburgensis*, Frr., of *Epunda lutulenta*, Bork. Mr. Winkley, on behalf of Mr. Montgomery, of Ealing, specimens of a second brood of *Argynnis selene*, Schiff., from Abbott's Wood; also a beautiful under-side var. of *Lycæna bellargus*, Rott., from Eastbourne, having a very light ground, a blue base, and many of the usual dark markings obliterated, while others were extended. Mr. Oldham, series of *Odonestis potatoria*, L., bred, from Cambs, three males being of the female coloration; also *Colias edusa*, Fb., one *Leucania albipuncta*, Fb., and suffused red *Phlogophora meticulosa*, L., from Folkestone; and black forms of *Xylophasia polyodon*, L., from Woodford. Mr. R. Adkin, a very beautiful series of *Noctua depuncta*, L., from Morayshire. Mr. Hy. J. Turner, a bred series of *Xanthia fulvago*, L., from Surrey, including var. *flavescens*, Esp., and the dark yellow form; a series of *Epinephele hyperanthus*, L., from Chattenden, including var. *arete*, Mull., and an intermediate form; specimens of *Silpha quadripunctata*, L., from the New Forest, and a dark var. of the same species from Chattenden; and a specimen of *Crioceris merdigera*, F., from the same locality. A discussion ensued upon the occurrence of *Colias edusa*, Fb., this season, and Mr. Winkley stated that Mr. Montgomery, of Ealing, had taken seventeen specimens at Eastbourne, and had already bred seventy-eight from the ova obtained.

October 24*th*.—The President in the chair. Colonel Partridge was elected a member. Mr. Frohawk exhibited two specimens of *Acherontia atropos*, L., one of which had been washed ashore in Glamorgan; and the other taken at the lighthouse of St. Agnes, Scilly. It was remarked that the species had occurred singly in many places this autumn. Mr. Oldham, series of *Mamestra brassicæ*, L., from Wisbeach and Woodford, those from the latter place being darker; two *Cosmia paleacea*, Esp., from Lancashire; *Xylina semmibrunnea*, Haw., and several other species from Folkestone. Mr. R. Adkin, two series of *Himera pennaria*, L., from the New Forest and Abbot's Wood respectively, and contributed notes. Mr. Thornhill communicated a series of observations upon a brood of *Arctia caia*, L., analysing the smaller variations shown. Mr. West exhibited a bug, *Zicrona cærulea*, L., taken by Mr. Billups on the fungus table at the Exhibition at St. Martin's Hall. Mr. Carrington and Mr. Frohawk reported having seen fresh specimens of *Colias edusa*, Fb., on the south coast, on October 20th. Mr. Edwards read a paper, communicated by Mr. Step, entitled "Notes on Sea-anemones." Mr. Turner laid on the table a full report of the Annual Exhibition, which will doubtless be printed in the yearly 'Abstract of Proceedings.'

November 14*th*.—The President in the chair. Mr. Griffith, of Bristol, was elected a member. Mr. Briggs exhibited a living specimen of the Madeira cockroach, *Panchlora maderæ*, taken in Covent Garden Market. Mr. Edwards, specimens of the rare Morphos, *M. cacica* and *M. neoptolemus*, from Peru. Mr. R. Adkin, a series of *Emmelesia* *tæniata*, St., from Co. Kerry, lighter than the English form, and a specimen of *Arctia caia*, L., from Louth, with very intense black-brown markings. Mr. H. W. Williams, a bred series of *Oporabia dilutaria*, Bork., including two very dark uniform specimens, and one with a light marginal area. Mr. McArthur, living larvæ and a recently-emerged imago of *Triphæna comes*, Hb., var. *curtisii*, Newm., from Orkney, and said all the captured ones were of that form. Mr. Turner, a specimen of *Phorodesma smaragdaria*, Fb., unique in being bred on September 26th; and several varieties of *Vanessa urticæ*, L., one of which had the central spots reduced to minute dots. Mr. Mansbridge, a series of *Scoparia basistrigalis*, Knaggs, taken at sugar in Epping Forest. Mr. Sturt, a living larva of *Sphinx convolvuli*, L., from Cornwall, with drawings of the others he had had. It was noted that one specimen was of the rare striped form of the larva. A discussion took place as to the necessity of forcing the pupæ of the larger hawk-moths. Mr. South, a short bred series of *Acronycta menyanthidis*, View., from Macclesfield, and stated that the larvæ were found chiefly on sallow, but a few were taken off birch. Mr. Ashdown, a number of Lepidoptera, including a strange var. of *Melanippe sociata*, Bork., having a light looped band from the costa, including the discoidal spot.—HY. J. TURNER, *Hon. Report. Sec.*

CHESTER SOCIETY OF NATURAL SCIENCE AND LITERATURE.—The first general meeting of the winter session took place at the Grosvenor Museum on October 31st, when the opening address was given by the President, Dr. Stolterfoth, "On the Compound Eye of Insects." The lecture was illustrated by lantern slides, microscopical sections, and diagrams. The following were among the many interesting exhibits:—(1) Vertical section of an insect's eye seen through the microscope. This showed an outline of the faceted cornea, the rods, cones, retina, and optic nerve. (2) Picture of boy and girl seen through the cornea of the eye of a water-beetle, *Dytiscus marginalis*. The cornea was fixed in a microscope, and appeared starred with exact duplicates of the picture. (3) An insect, a Thrips, also seen through the prepared cornea fixed in a microscope. The cornea appeared starred with duplicates of the insect, each facet showing a picture as in no. 2. (4) Lantern exhibition slides, photographed by the lecturer, showing the pictured cornea in the above illustrations. A cordial vote of thanks was given to Dr. Stolterfoth for his interesting lecture; and the Mayor, W. H. Churton, was also suitably thanked for presiding.—J. ARKLE; 2, George Street, Chester.

BIRMINGHAM ENTOMOLOGICAL SOCIETY. — *September 16th*, 1895.—Mr. G. T. Bethune-Baker, President, in the chair. Mr. J. W. Smallwood, 18, Pakenham Road, Edgbaston, was elected a member of the Society. Exhibits:—By Mr. B. C. Bradley, a specimen of *Didea alneti*, the pale green form, from Sutton; also one of *Echinomyia grossa*, from Sutton, where it has not been taken before. By Mr. P. W. Abbott, *Lithosia griseola* and var. *flava*, from Norfolk, and *Hepialus humuli* var. *hethlandica*, from the Shetlands. By Mr. Valentine Smith, beetles from Braunton Burrows: *Nebria complanata* (a nice series), *Phaleria cadaverina*, and *Psammodius sulsicollis*. By Mr. Wainwright, a single specimen of *Colias edusa*, taken at Lynton in August; also *Macroglossa stellatarum*, from the same place.

October 21st.—The President in the chair. Exhibits:—By Mr. A. H. Martineau, a specimen of *Didea* from Nevin, N. Wales, differing in the bands from any specimen of *Didea* possessed by Mr. R. C. Bradley, and which he had referred doubtfully to *D. fasciata;* also one dark specimen of *Xylophasia monoglypha* from Solihull; also a *Chelifer*, which he had found clinging to the leg of an *Anthomyia* caught in his house at Solihull; when expanded and put into a test-tube the *Chelifer* had made many attempts to get on to the fly again, whenever the fly approached it. He also showed, and read notes upon, some abnormally early-developed *Andrena clarkella* and *Nomada borealis*. He had dug them up at Solihull, fully developed, as early as October 6th, and although he searched hard he could not even find any larvæ left, although usually the Andrenæ remain undeveloped until much later, the earliest previous dates for perfect insects being December 28th, when Mr. Bradley in 1893 got two *A. fulva* (females) and one *A. cinerea* (male), with larvæ, at Sutton; and December 30th, when Mr. Enock records having obtained *A. nigroœnea* in 1884. The earliest date on which Mr. Martineau has seen *A. clarkella* on the wing in the spring is March 18th. By Mr. W. Harrison, *Lycæna icarus* from Hampton near Bridgenorth, the females being bluish; *Trypeta cardui*, bred from galls found on the thistle, also at Hampton; and other insects. By Mr. R. C. Bradley, *Plusia festucæ* from Barmouth; also a very remarkable Geometer, which Mr. Barrett had referred with considerable hesitancy to *Thera firmata*, which was taken at Dursley, Glos., by Mr. R. W. Fitzgerald. Mr. Bethune-Baker said he did not think it was a *Thera* at all, and wished Mr. Barrett to see it again. By Mr. G. W. Wynn, *Agrotis obelisca* from Sutton; one *Xylina petrificata* from Wyre Forest, an insect quite new to the district; and a pretty variety of *Agrotis corticea* from Lapmouth. By Mr. P. W. Abbott, *Sesia scoliiformis* from Scotland and Llangollen; also *Pachetra leucophæa*, several specimens taken this year in the old locality in Kent.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*Second Annual Meeting.*—The business of the meeting was to elect officers and council for the following year. After the usual reports from the Secretary, Treasurer, Librarian, and Officers, the following gentlemen were elected to serve for the coming year:—President, Mr. Jackson; Vice-President, Mr. A. Norman; Treasurer, Mr. H. Blake; Secretary, Mr. F. West; Librarian, Mr. Newbery; Curator, Mr. W. Harper; Assistant Secretary, Mr. J. Craft; Trustees, Mr. Huckett and Mr. Gurney.—J. G. CRAFT, *Assistant Sec.*

ERRATA.—P. 288, line 2, for "Riffel Alps" read "Riffel Alp." P. 289, line 4 from top, for "Randersteg" read "Kandersteg." P. 301, line 14 from top, for "Mr. H. Mitchell" read "Mr. A. T. Mitchell."

WEST, NEWMAN AND CO., PRINTERS, HATTON GARDEN, LONDON, E.C.

SUBSCRIPTIONS FOR 1895 ARE NOW DUE.

Vol. XXVIII.] JANUARY, 1895. [No. 380.

THE ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

308553

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,
56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s.; &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

WITH PORTRAIT.

Vol. XXVIII.] FEBRUARY, 1895. [No. 381.

THE

ENTOMOLOGIST

AN

Illustrated Journal 305404

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.	W. F. KIRBY, F.L.S., F.E.S.
T. R. BILLUPS, F.E.S.	J. H. LEECH, B.A., F.L.S., F.E.S.
W. LUCAS DISTANT, F.E.S., &c.	Dr. D. SHARP, F.R.S., F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.	G. H. VERRALL, F.E.S.
MARTIN JACOBY, F.E.S.	W. WARREN, M.A., F.E.S.

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

DOUBLE NUMBER.—Price One Shilling.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite

OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s.; &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

Vol. XXVIII.] MARCH, 1895. [No. 382.

THE

ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

307269

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s.; &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

Vol. XXVIII.] APRIL, 1895. [No. 383.

THE

ENTOMOLOGIST

AN

Illustrated Journal

309095

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> " By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

DOUBLE NUMBER.—Price One Shilling.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s.; &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

[illegible] MUSEUM STREET, OXFORD STREET, W.C.

Vol. XXVIII.] MAY, 1895. [No. 384.

310052

THE ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> " By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

Vol. XXVIII.] JUNE, 1895. [No. 385.

THE
ENTOMOLOGIST
AN
Illustrated Journal
OF
GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite

OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

Vol. XXVIII.] JULY, 1895. [No. 386.

THE

ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,
56, BROMPTON ROAD, LONDON, S.W.
Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

THOMAS COOKE & SON,
Naturalists, Dealers in Entomological Apparatus, &c.
(Late of 513, NEW OXFORD STREET),
30, MUSEUM STREET, OXFORD STREET, W.C.

H. W. MARSDEN,
Natural History Agent and Bookseller,
21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

Vol. XXVIII.] AUGUST, 1895. [No. 387.

THE ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

WITH A PLATE.

Vol. XXVIII.]   SEPTEMBER, 1895.   [No. 388.

319088

THE

ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

H. W. MARSDEN,

Natural History Agent and Bookseller,

21, NEW BOND STREET, BATH.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name do so illegally.

Vol. XXVIII.] OCTOBER, 1895. [No. 389.

THE

ENTOMOLOGIST

AN

Illustrated Journal

320672

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

"By mutual confidence and mutual aid
Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

H. W. MARSDEN,

Natural History Agent and Bookseller.

40, TRIANGLE (West), CLIFTON, BRISTOL.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name

WITH EXTRA EIGHT PAGES.

Vol. XXVIII.] NOVEMBER, 1895. [No. 390.

THE
ENTOMOLOGIST
AN
Illustrated Journal
OF
GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price Sixpence.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite
OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; $1\frac{1}{4}$, 7d.; $1\frac{1}{2}$, 8d.; $1\frac{3}{4}$, 9d.; 2 in., 10d.; $2\frac{1}{4}$, 11d.; $2\frac{1}{2}$, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, $1\frac{1}{2}$d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

H. W. MARSDEN,

Natural History Agent and Bookseller,

40, TRIANGLE (West), CLIFTON, BRISTOL.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name

DOUBLE NUMBER.—SUBSCRIPTIONS FOR 1895 HAVE EXPIRED.

Vol. XXVIII.] DECEMBER, 1895. [No. 391.

THE

ENTOMOLOGIST

AN

Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.
T. R. BILLUPS, F.E.S.
W. LUCAS DISTANT, F.E.S., &c.
EDWARD A. FITCH, F.L.S., F.E.S.
F. W. FROHAWK, F.E.S.
MARTIN JACOBY, F.E.S.
W. F. KIRBY, F.L.S., F.E.S.
J. H. LEECH, B.A., F.L.S., F.E.S.
Dr. D. SHARP, F.R.S., F.E.S., &c.
G. H. VERRALL, F.E.S.
W. WARREN, M.A., F.E.S.

> "By mutual confidence and mutual aid
> Great deeds are done and great discoveries made."

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

Price One Shilling.

E. H. MEEK, Naturalist,

56, BROMPTON ROAD, LONDON, S.W.

Supplies Entomologists with every Requisite

OF THE BEST MAKE.

SEND FOR NEW PRICED CATALOGUE, POST FREE.

All Orders, when accompanied by Post Office Order, will receive immediate attention.

Steel Knuckle-jointed Net, folds up for pocket, 4s.
Ladies' Umbrella Net, 5s. Wire Ring Net, with brass screw, 2s.
Pocket Folding Net, with three brass joints, 3s. 6d., 4s.
Balloon Net, 26 by 18, for Beating, &c., 6s. Telescope Net, 6s., 8s. 6d., 10s. 6d.
Self-acting Sweeping Net, 8s. Larva Box, 6d., 1s., 1s. 6d.
Sugaring Tins, with Brush affixed, 1s. 6d., 2s. Killing Box, 9d., 1s.
Bottle of Killing Fluid, 9d.
Corked Setting Boards, 1 in., 6d.; 1¼, 7d.; 1½, 8d.; 1¾, 9d.; 2 in., 10d.; 2¼, 11d.; 2½, 1s. &c., &c. Mahogany Pocket Box, with glass to slide in groove, 3s. 6d.
Entomological Pins, any size, Gilt or Plain, 1s. per box; four sizes, mixed, 1s. per oz. (by post, 1½d.) Exchange Lists, 1d.
Bottle of Mite Destroyer, 9d. Willow Chip Boxes, nested, four sizes, 1s. 8d. gross.
Setting and Drying Houses, complete, 9s. 6d., 11s., 13s.
Pocket Box, 6d., 9d., 1s., 1s. 6d. Postal Boxes, 6d., 9d., 1s.
The Entomologist's Store and Setting House, containing every requisite, £3.
Improved Pocket Lanterns, 2s. 6d., 3s. 6d.
Zinc Oval Pocket Box, 9d., 1s., 1s. 6d., 2s. Pupa Diggers, 2s., 3s.
Corked Store Boxes, best make, 2s. 6d., 4s., 5s., 6s.; ditto, covered in Green Cloth, Book Pattern, 16 by 11, 8s. 6d. Tin Y, 2d.; Brass Y, 8d., for Cane Nets.

A LARGE ASSORTMENT OF BRITISH AND FOREIGN INSECTS KEPT IN STOCK.

CABINETS of every Description in Stock and to Order. Estimates given.

THOMAS COOKE & SON,

Naturalists, Dealers in Entomological Apparatus, &c.

(Late of 513, NEW OXFORD STREET),

30, MUSEUM STREET, OXFORD STREET, W.C.

H. W. MARSDEN,

Natural History Agent and Bookseller,

40, TRIANGLE (West), CLIFTON, BRISTOL.

EUROPEAN LEPIDOPTERA.
The largest and best stock in England at very moderate prices.
EXOTIC LEPIDOPTERA, COLEOPTERA, ORTHOPTERA, &c.
PRESERVED LARVÆ of rare British Lepidoptera.
CABINETS and APPARATUS of all kinds for ENTOMOLOGISTS, OÖLOGISTS, ORNITHOLOGISTS, BOTANISTS, &c.
BOTANICAL CASES, DRYING PAPER, &c.
BRITISH and EXOTIC SHELLS.
BRITISH SPECIES of BIRDS' SKINS and BIRDS' EGGS.
Of these the stock is far the largest and most authentic in Britain, probably in Europe; while a large stock of Exotic Skins and Eggs, especially American, are always on hand. YOUNG BIRDS in Down.
Parcels of Exotic Insects, Birds, or Shells, sent for selection. British Birds' Skins sent on approval. Other articles guaranteed.
The BEST BOOKS ON ABOVE SUBJECTS recommended and supplied.

(Send for the new and enlarged Catalogue of January, 1893.)

N.B.—Mr. MARSDEN's well-known Gloucester business has been entirely removed to the above address, and any person or persons pretending to be his successors or using his name

NATURALISTS' SUPPLY STORES,

64, HIGH STREET, ETON.

Proprietor, E. EDMONDS,

Entomologist to the ROYAL FAMILY and ETON COLLEGE.

Full price Catalogue on application.

Specialty:—LIVING OVA, LARVÆ, and PUPÆ.

(No larger Stock in Europe.)

BREEDING GROUNDS: The "NURSERY," OSBORNE ROAD, WINDSOR.
Also at KING STABLE STREET, ETON.

PRICE LISTS are issued about 1st and 15th of each month; on RECEIPT of 1*s.* every list issued for one year will be sent free.

64, HIGH STREET, ETON.

DR. STAUDINGER & BANG-HAAS, BLASEWITZ-DRESDEN, in their new Price List, No. XXXVIII., offer more than 13,500 Species of well-named LEPIDOPTERA, set or in papers, from all parts of the world, in finest condition; 1100 kinds of PREPARED LARVÆ; numerous LIVING PUPÆ, &c. SEPARATE PRICE LISTS, X. & XIII., for COLEOPTERA (16,000 species). Lists II. & III., for HYMENOPTERA (1900 species), DIPTERA (9000), HEMIPTERA (1200), ORTHOPTERA (700), NEUROPTERA (320). List IX., for SHELLS (7000). Discount for Cash-orders.

WATKINS & DONCASTER,

Naturalists and Manufacturers of Entomological Apparatus and Cabinets.

Plain Ring Nets, wire or cane, including Stick, 1s. 3d., 2s., 2s. 6d. Folding Nets, 3s. 6d., 4s. Umbrella Nets (self-acting), 7s. Pocket Boxes, 6d., 9d., 1s., 1s. 6d. Zinc Relaxing Boxes, 9d., 1s., 1s. 6d., 2s. Nested Chip Boxes, 8d. per four dozen. Entomological Pins, assorted or mixed, 1s. 6d. per oz. Pocket Lanterns, 2s. 6d. to 10s. 6d. Sugaring Tin, with brush, 1s. 6d., 2s. Sugaring Mixture, ready for use, 1s. 9d. per tin. Store Boxes, with camphor cells, 2s. 6d., 4s., 5s., 6s. Setting Boards, flat or oval, 1 in., 6d.; 1½ in., 8d.; 2 in., 10d.; 2½ in., 1s.; 3½ in., 1s. 4d.; 4 in., 1s. 6d.; 5 in., 1s. 10d.; Complete Set of fourteen Boards, 10s. 6d. Setting Houses, 9s. 6d., 11s. 6d.; corked back, 14s. Zinc Larva Boxes, 9d., 1s., 1s. 6d. Breeding Cage, 2s. 6d., 4s., 5s., 7s. 6d. Coleopterist's Collecting Bottle, with tube, 1s. 6d., 1s. 8d. Botanical Cases, japanned, double tin, 1s. 6d., 2s. 9d., 3s. 6d., 4s. 6d. Botanical Paper, 1s. 1d., 1s. 4d., 1s. 9d., 2s. 2d., per quire. Insect Glazed Cases, 2s. 6d. to 11s. Cement for replacing Antennæ, 6d. per bottle. Steel Forceps, 2s. 6d. per pair. Cabinet Cork, 7 by 3½, best quality, 1s. 4d. per dozen sheets. Brass Chloroform Bottle, 2s. Insect Lens, 1s. to 8s. Glass-top and Glass-bottomed Boxes from 1s. 4d. per dozen. Zinc Killing Box, 9d., 1s. Pupa Digger, in leather sheath, 1s. 9d. Taxidermist's Companion, containing most necessary implements for skinning, 10s. 6d. Scalpels, 1s. 3d.; Scissors, 2s. per pair; Egg-drills, 2d., 3d., 1s.; Blowpipes, 4d., 6d.; Artificial Eyes for Birds and Animals; Label-lists of British Butterflies, 2d.; ditto of Birds' Eggs, 3d., 4d., 6d.; ditto of Land and Fresh-water Shells, 2d.; Useful Books on Insects, Eggs, &c.

Now ready.—The EXCHANGE LIST. Compiled by Mr. ED. MEYRICK, B.A., F.Z.S., F.E.S., according to his recent 'Handbook of British Lepidoptera.' 1½d. each; 8d. per doz.; or 4s. per 100.

Our new Label-list of British Macro-Lepidoptera, with Latin and English names, 1s. 6d. Our new Complete Catalogue of British Lepidoptera (every species numbered), 1s.; or on one side for labels, 2s.

The "DIXON" LAMP-NET (invaluable for taking moths off street-lamps without climbing the lamp-posts), 2s. 6d.

SHOW ROOM FOR CABINETS

Of every description for INSECTS, BIRDS' EGGS, COINS, MICROSCOPICAL OBJECTS, FOSSILS, &c. Catalogue (66 pp.) sent on application, post free.

A LARGE STOCK OF INSECTS AND BIRDS' EGGS
(BRITISH, EUROPEAN, AND EXOTIC).

Birds, Mammals, &c., Preserved and Mounted by First-class Workmen.

Only Address:—

36 STRAND, W.C., LONDON (5 doors from CHARING CROSS).

CONTENTS.

Mesogona acetosellæ, *Fab.* (with illustration), *Robert Adkin*, 317. A New Classification of Lepidoptera, *T. A. C.*, 318. On the Vertical Distribution of the Rhopalocera in the Alps, *W. Harcourt-Bath*, 322. A Catalogue of the Lepidoptera of Ireland, *W. F. de Vismes Kane*, 327. "The Killing and Preservation of Insects," *B. Stafford-Chope*, 331. Notes on Orthoptera, *C. W. Dale*, 333.

NOTES AND OBSERVATIONS.—On Breeding Arctia caia for Varieties, *J. Arkle*, 334. A Convenient Ammonia-bottle for Field use, *N. F. Searancke*, 335.

CAPTURES AND FIELD REPORTS.—Larvæ of Sphinx convolvuli from Cornwall, *W. T. Sturt*, 336. Sphinx convolvuli in Surrey, *Rev. J. E. Tarbat*, 336; in Gloucester, *R. W. Fitzgerald*, 336; in South Wales, *T. B. Jefferys*, 336; in Lincolnshire, *W. Lewington*, 336. Catocala fraxini in N. Devon, *O. F. E. Cooke*, 336. Accidental Aberration of Euchelia jacobææ? *Frank Bromilow*, 336. Acherontia atropos in Lincolnshire, *W. Lewington*, 336. Hesperia comma, &c., in Lancashire, *J. B. Hodgkinson*, 336. Pieris daplidice in Kent, *C. Swinhoe*, 337. Colias edusa in 1895—Additional Records, 337: *Rev. J. E. Tarbat*, *W. J. Lucas*, *H. Douglas Stockwell*, *Miss M. Wilson*, *W. J. Lucas*, *H. M. Edlesten*. Late specimens of Colias edusa in Britain, *Richard South*, 337. Second Brood of Nemeobius lucina, *Walter A. Pearce*, 338. Larvæ in Surrey and Kent, *E. A. Brackenbury*, 338. Sugaring in the Cotswolds, 1895, *R. W. Fitzgerald*, 338. Notes on Crambites, 1895, *Albert H. Waters*, 339. Notes from Shropshire, *F. C. Woodforde*, 339. Notes on the Season, *W. H. Blaber*, 339. Collecting in the South, *C. T. Nash*, 340. Collecting in 1895, *A. R. and R. H. Heath*, 341. SOCIETIES, 342.

SUBSCRIPTIONS *for* 1895 *have now expired. Prepayment for* 1896 (6*s.*, *including all double numbers and postage to any part of the world*) *may be made to* WEST, NEWMAN & CO., 54, *Hatton Garden, London. This number is Double, and price One Shilling to non-subscribers.*

WILLIAM WATKINS, Entomologist,

VILLA SPHINX, EASTBOURNE.

LARGEST STOCK of EXOTIC LEPIDOPTERA in the KINGDOM. Fresh Collections always arriving from the most isolated places. I am particularly rich in species from New Guinea and South America.

My system of "*APPROVAL BASKET*" is a great success. It contains lovely specimens at lowest prices. Please ask to see it; it will cost you nothing unless you purchase. Prices are lower than those of auction, and the specimens faultless in condition.

Collections purchased, or named and arranged.

N.B.—I have the finest Reference Collections, and most experienced Staff of Assistants in England.

JAMES GARDNER,

MANUFACTURER of ALL KINDS of ENTOMOLOGICAL APPARATUS,

29 (late 426), OXFORD STREET

(Nearly opposite Tottenham Court Road).

PRICED LISTS ON APPLICATION.

All Articles Guaranteed; exchanged if not approved of. Friends and Customers are requested to note the Address, as mistakes occur daily.

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 00908 1167